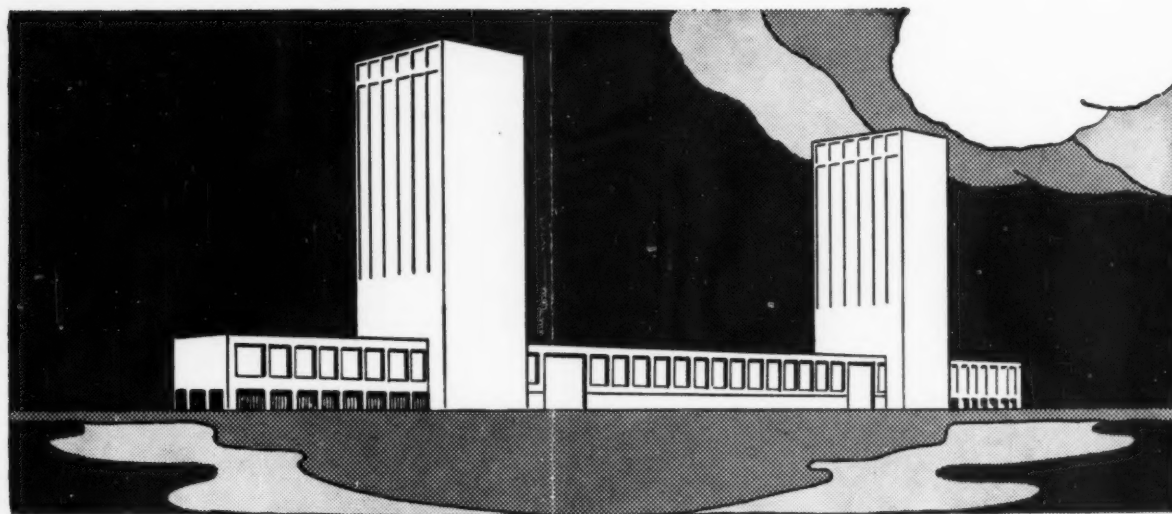


# The Mining Journal

LONDON, JANUARY 10, 1958

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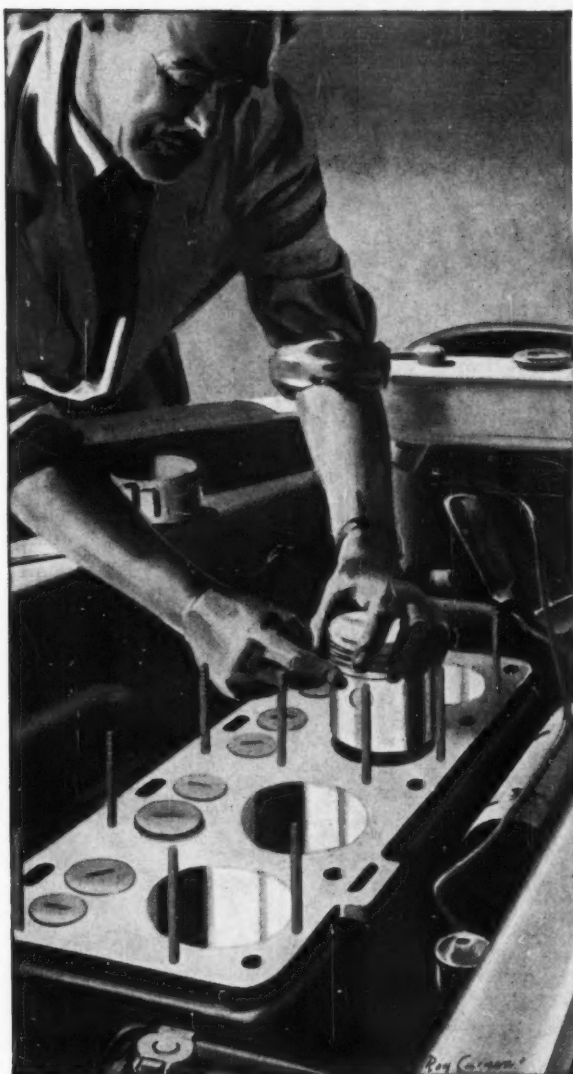
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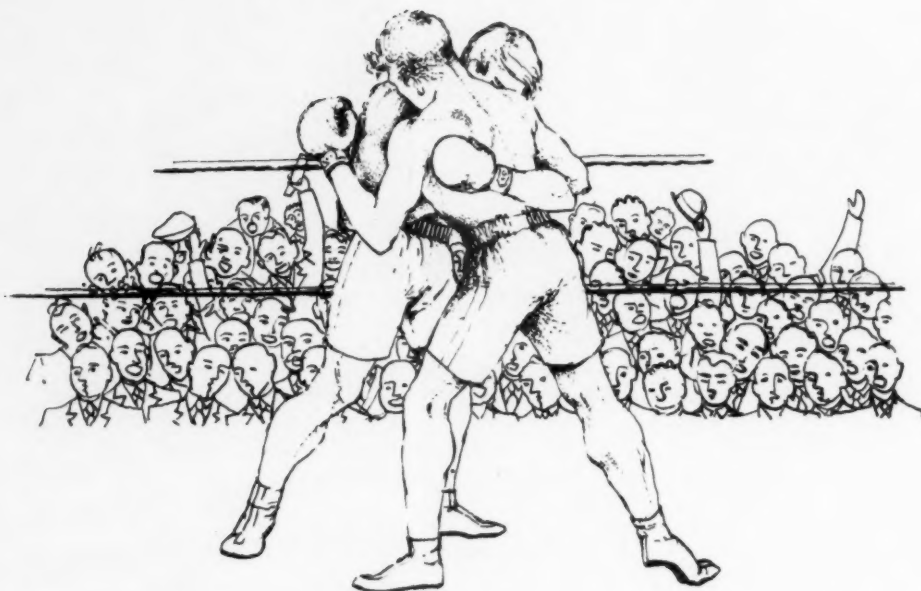
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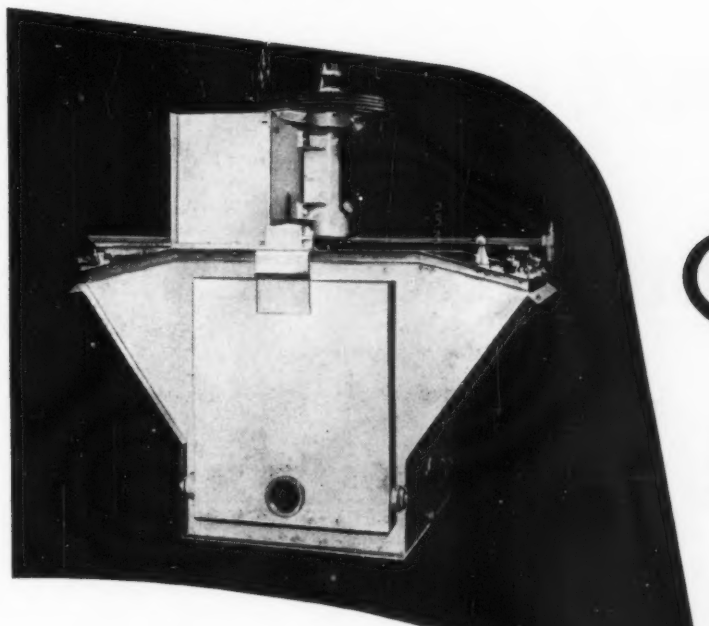
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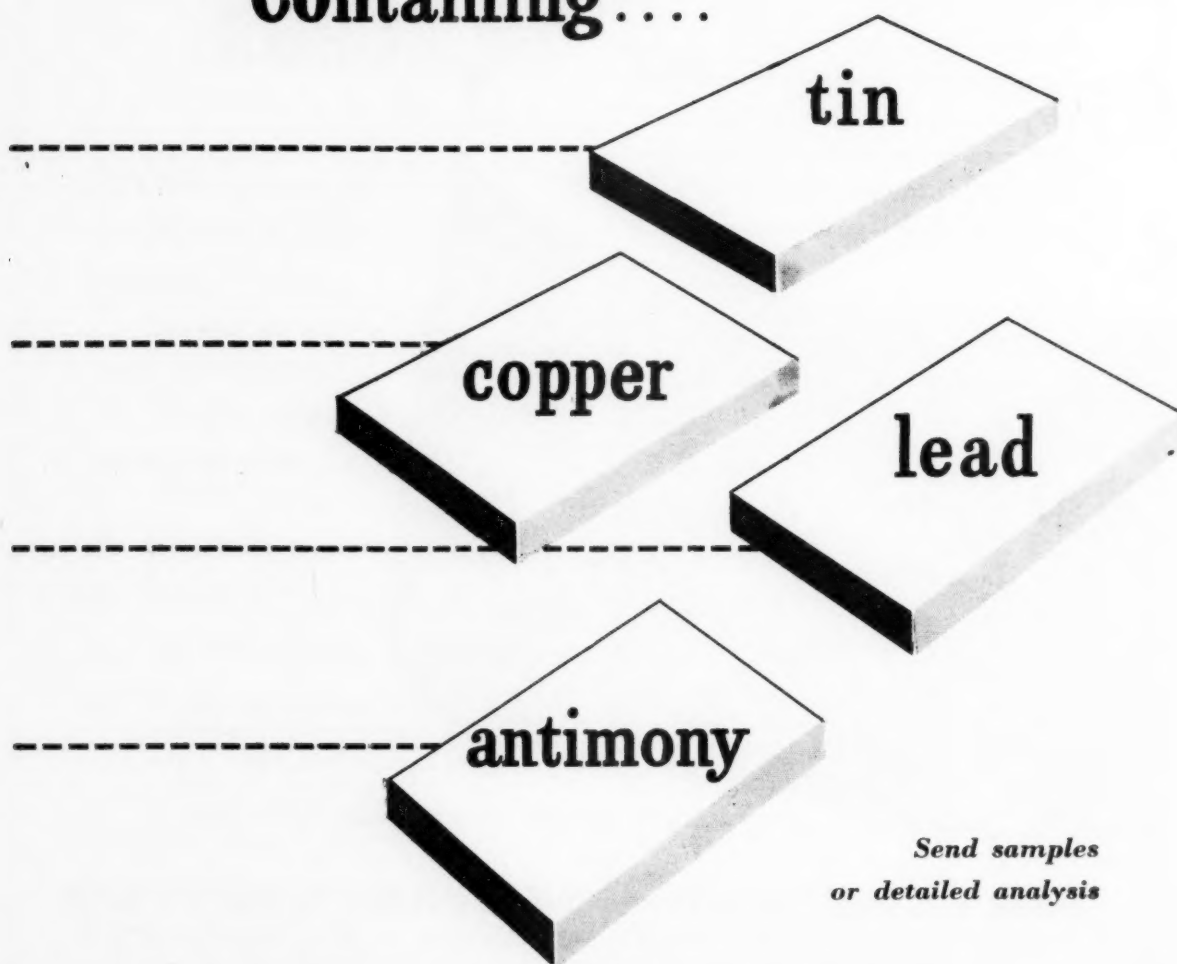
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London, January 10, 1958

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## Technical Aid for the Far East

UNDERLYING the deliberations of the recent NATO summit conference has been a growing realization in the United States and other member countries that Russia's spectacular achievements in the fields of sputniks have tended to obscure the no less critical challenge presented by the spread of Communist influence in undeveloped territories, which is largely the result of economic penetration. Despite the enormous sums made available from Western sources, such as the International Co-operation Administration, the World Bank, and the Colonial Welfare and Development Fund, Russia is rapidly emerging as a formidable rival to the NATO powers in the role of Fairy Godmother to the Middle and Far East.

The outlook for humanity would indeed be transformed if the globular sums now being expended on hydrogen bombs and guided missiles could be diverted into an economic battle for the improvement of living standards, in which the weapons were financial and technical aid for the more backward countries. This Utopian vision is perhaps less of a pipe dream than it might appear, for very real progress in this direction has, in fact, been made, notably through the establishment of machinery such as the United Nations Economic Commission for Asia and the Far East (ECAFE), in which both the Soviet Union and the Western Nations are represented. Whether this collaboration is competitive or co-operative, it can only be beneficial for the countries whom ECAFE exists to serve.

At a meeting of ECAFE'S sub-committee on mineral resources, held recently in Calcutta, the U.S.S.R., the United States, the United Kingdom, Australia and France each offered the countries of the region technical assistance, information and training in the prospecting and utilization of radioactive minerals. The United States and the U.S.S.R. offered to supply details of their technical publications in the nuclear field and gave particulars of the knowledge they could contribute to Asian efforts to utilize the newest sources of energy.

In his inaugural address Mr. K. D. Malaviya, Minister for Mines and Oil, Government of India, called for maximum co-operation between the various countries for the development of mineral resources, pointing out that a greater interchange of information on a liberal scale and a programme of mutual scientific and technical assistance would be of immense help in India's plans for economic development. Mr. Malaviya emphasized that the mineral resources of the East, though known to be sufficiently vast, had to a considerable extent remained unexplored. Before it was possible to co-ordinate the work of assessing the natural resources of Asia, the various countries had much to learn from one another about the measures to be taken for comprehensive planning.

Mr. C. V. Narasimham, executive secretary of ECAFE, said that the mineral situation in the region had shown further improvement since the last session of the sub-committee in Tokyo last year. Record outputs had been registered in basic mineral commodities such as coal, iron ore, petroleum and natural gas. Increasing attention had also been paid by the governments to the development of other minerals.

On the subject of energy, Mr. Narasimham said that nuclear fuel had captured the imagination of many countries of the region. More radioactive mineral deposits had to be discovered and developed.

The meeting, which discussed prospecting for uranium and other radioactive minerals as a source of atomic fuel, heard India, Malaya, Japan and British Borneo report on the results of their searches. A report from the Indian delegation outlined the occurrence of uranium and thorium in Rajasthan, Bihar, West Bengal, Madras and Kerala, and described deposits of heavy mineral sands containing thorium. The Indian Department of Atomic Energy has made an initial exploration of the shallow seas off the Kerala coast, proving the existence of mineral sands on the sea floor.

The development of petroleum resources was also discussed by the sub-committee, which decided that a seminar on this subject should be held for Asian countries towards the end of next year.

It is difficult to assess the extent to which progress in the development of the region's mineral resources can be attributed directly to the inspiration and guidance of ECAFE. There can be no doubt, however, that by serving as a funnel through which technical assistance from both sides of the Iron Curtain can be canalized, and at the same time as a centre for liaison between the various regional countries themselves, ECAFE is playing a key role in the economic progress of Asia and the Far East.

This fruitful experiment in international co-operation holds out encouraging prospects of what might be achieved for the world when the arms race is over and the vast financial and technical resources currently allocated to the development of inter-continental missiles can be released for peaceful and more constructive needs.

## CANADA SPEEDS MINING RESEARCH

Fundamental research into the hows and whys of mineral formations is now receiving attention in the work of the Geological Survey of Canada, Department of Mines and Technical Surveys. It is hoped that this research activity will result in a considerable saving of time and expense to prospectors and mining companies in their search for mineral deposits. The improved prospecting techniques that are expected to result from this research will aid in narrowing down the areas in which the deposits are most likely to be found.

In the last five years the Geological Survey has established three laboratories, staffed by more than a dozen scientists to carry on nuclear, geochemical and geophysical research. They seek to find out more about such things as the migration of elements in the rocks of the earth's crust and the factors that led to their concentration as orebodies.

To support, widen and stimulate geological research, the Geological Survey of Canada awards grants in aid to research workers in Canadian universities. Since 1951 these grants total \$185,000, including \$40,000 in the current fiscal year.

These grants are awarded on the advice of the National Advisory Committee in the Geological Sciences. This year 16 research projects are being supported in nine universities. At present 31 projects in 11 Canadian universities receive support through these federal grants, and 27 other projects are completed.

By helping to make possible the acquisition of much-needed equipment and technical assistance this financial aid is raising the standard of research in geological sciences in the universities. This improvement is indicated by the pub-

lication in scientific research journals of more than 50 papers recording the results of projects supported by these grants.

At the University of Toronto weathering effects on 25 minerals and six rock types will be investigated. Little or nothing is known of the time required for clays to form from minerals and rocks, and findings from these tests will be useful in a variety of scientific fields. At the University of Western Ontario, tests will be made of the response of typical geological structures on electro-magnetic prospecting devices. Interpretation of the readings of these airborne devices is difficult and these measurements should help solve the problem.

## ALUMINIUM'S PROGRESS AND PROSPECTS

For the first time for several years the aluminium industry in the U.S. has failed to set up a new record for primary output. The final production figures for 1957 are not yet available, but it is generally anticipated that the total quantity of primary metal produced during the year will be between 1,640,000 and 1,645,000 s.tons, which compares with the 1956 output of nearly 1,680,000 s.tons.

While no new production records were set up, 1957 was a memorable year for the aluminium industry because ample supplies at last became available for civilian use. The availability of aluminium led to vigorous marketing programmes on the part of both producers and fabricators. According to Mr. R. S. Reynolds, Jr., President of Reynolds Metal Co., consumption of aluminium in 1957 was expected to be only slightly lower than 1956—no mean achievement on the part of the industry's marketing organizations, having regard to the more difficult conditions prevailing in recent months.

Mr. Reynolds notes that the consensus of economic forecasts for the U.S. in 1958 indicate a slight decline of business during the first half and some improvement in the second half, with volume for the full year at or about 1957 levels. Under these conditions, he stated, Reynolds' sales should be higher in 1958 than in 1957, which was expected to be the company's record sales year.

A similar prediction is made by Mr. Frank L. Magee, President of Alcoa, who foresees an increase in 1958 "with the present abundance of metal contributing to broadened usage in both new and existing applications".

Mr. D. A. Rhoades, vice-president and general manager of Kaiser Aluminium and Chemical Corporation, has also expressed the opinion that "basic economic factors are present" to make 1958 a year of advance for the aluminium industry. He considered that, although in 1957 there was some surplus of aluminium over and above the immediate demand requirements, the aluminium industry over the next several years would parallel its rapid expansion in the 12 years since World War II, but on a vastly larger scale. During 1958 Kaiser plans to intensify its present efforts to expand present uses and develop new ones.

Alcoa's primary aluminium capacity will be raised by 20,000 tons in 1958 from new facilities at the Comfort (Texas) smelter. The company will also begin production during the year at its new works in Warwick, Indiana, where an ultimate capacity of 150,000 tons yearly is planned. Major reduction installations are also under construction by Harvey Aluminium, Ormet and Reynolds.

Meanwhile, low water conditions in the Columbia River area have forced Kaiser to shut down two potlines at its Mead reduction works. In effect, monthly primary aluminium production in the Northwest has now been reduced

by roughly 8,900 tons, Alcoa having cut back operations last autumn at its Vancouver and Wenatchee plants. Recent weather conditions have been rather more favourable and all regional power resources were to be reviewed on January 1. It is not expected, however, that the facilities now standing idle will be reactivated until uninterrupted power is much more certain.

In view of the present situation of temporary oversupply, which, unfortunately, has coincided with the start of production at Canadian British Aluminium's new smelter in Quebec, it can be anticipated that the current year will bring increasing competition in export markets throughout the Free World. What with American metal now being offered in the U.K. and other European markets, the prospect of increased production from Canada and the U.S., and the possibility of intensified efforts to sell Russian aluminium in the U.K. and Western Europe, there are already indications of strong price competition.

Russian aluminium is generally regarded in London as costing £185 a ton delivered to the customer's plant, being thus about £12 under the basic Canadian quotation. There have recently been reports, however, of Russian sales at as low as £181 per ton. It is believed that sales at the latter price were made on a spot basis, to special customers.

West Germany's major aluminium plants are curtailing output by 5 to 10 per cent as a result of reduced import prices for Canadian aluminium, which is now offered at DM.2.28 per kilo compared with the German price of DM.2.33.

The buyers' market now materializing will not last indefinitely, its duration depending primarily on the economic climate in the U.S. Mr. Reynolds made the interesting statement that, as indicated by the experience of his company, the demand for aluminium goes off proportionately less than that of other major competitive materials during periods of economic decline. In a period of rising business activity, however, it increases at a much more rapid rate than the general economy.

Recognition of these characteristics of the market for aluminium is implicit in the current expansion programmes of North American producers, whose confidence in the long-term outlook appears to be quite unshaken by present difficulties.

## PROSPECTING AND MINING IN UGANDA

The annual report of the Geological Survey Department, Uganda Protectorate, for the year ended December 31, 1956, reveals that steady progress was made in the basic geological mapping of the Protectorate, although the total area covered was rather less than in 1955. Economic geological studies of mineral deposits were continued, particularly in Ankole, Bugisu, Karamoja and Toro.

Electrical geophysical survey methods were employed in the investigation of occurrences of copper mineralization at Karasuk. An appraisal was made of the economic potential, and a limited drilling programme recommended to the prospectors. Magnetometric measurements were made in the vicinity of Mount Elgon in the Eastern Province, with the object of locating workable deposits of magnetite. No deposits of economic importance were discovered.

Other activities included ratemeter surveys, made in Busoga over areas in which indications of a radioactive mineral had been observed, although no deposits of economic significance were located. Prospectors continued to make use on loan of Departmental ratemeters in the search for radioactive ores.

With the exception of wolfram and galena, mineral production in Uganda tended to decline in 1956. Nevertheless, prospecting was continued, much of it in the Impenetrable Forest of Kigezi, where there are indications that workable mineral deposits may be found.

No bismuth minerals were exported during 1956, although efforts were being made to bring Rwanzu mine into operation. Exports of beryl declined from 136.2 l.tons, valued at £19,676, in 1955 to 92 l.tons, worth £13,462, in 1956. This decline was the result of the withdrawal of a mining company and the consequent closure of a group of its small mines. Present production comes largely from one large pegmatite at Bulema. Several smaller pegmatites are still being worked, however, and as little equipment is required in dressing the ore there is considerable scope for the small worker. Output of columbite-tantalite fell in sympathy with the decreased production of beryl.

Prospecting for diamonds continued in several areas, and although it was confirmed that sporadic diamonds exist, no economic deposit was found. Production of gold declined from the export total of 449.17 oz. Troy, valued at £4,534, recorded in 1955, to 293.11 oz. Troy, worth £2,890, in 1956. Virtually all production now comes from the Bukedi district. Much attention was given to evaluating the economic potentialities of vermiculite occurrences at Bugisu.

At Kitaka mine in Northern Ankole, output of galena increased, exports rising from 73.21 l.tons in 1955 to 121.20 l.tons in 1956. The systematic development of the mine and an investigation of the surrounding country are in progress. Interest in tin mining has declined and the largest tin mine in Uganda closed down during the year. Exports of tin ore in 1956 totalled 47.43 l.tons, worth £17,828.

With exports rising from 136.33 l.tons, worth £111,888, in 1955, to 164.24 l.tons of £127,600 value, tungsten ores, ferberite and wolfram have for the past five years represented Uganda's most highly valued mineral exports. Despite copper's rise in local importance, tungsten ores should remain an important item of mineral production in the Protectorate. Indeed, tungsten ores have been found over a considerable area of Kigezi and almost certainly more ore-bodies exist. Investigation into the treatment of wolfram ores has been continued.

The report adds that torbernite was identified at the Department laboratory in rocks from Kigezi, the first recorded occurrence of this mineral in Uganda.

## SLIGHT DECLINE IN EUROPEAN COAL PRODUCTION

Plans submitted by governments within the U.N. Economic Commission for Europe indicate that on the basis of demand and stocks in hand, the expected production of coal in the current quarter will be rather less than for the comparable period of 1957. Nearly all the countries within the U.N.E.C.E. organization have submitted reduced requirements, the largest decrease being attributable to a diminished demand for coal for thermal power generation. Nearly all countries have fairly high stocks of such coal and, indeed, in certain European countries stocks are so high as to constitute an embarrassment to the industry.

However, as far as coal production is concerned no radical changes are anticipated and the decline in production will only be slight. The forecast is for a first quarter's output of hard coal in Europe (excluding U.S.S.R.) of 159,000,000 tons. It is expected that imports of coal from the U.S. will be 10 per cent lower than during the first three months of 1957. Imports of U.S. coal into Europe last year totalled approximately 45,000,000 tons.

## U.S. Mineral Output in 1957

**M**INERAL output in the United States attained a record value of \$18,300,000,000 in 1957, a gain of more than \$750,000,000 over 1956, the Secretary of the Interior, Mr. Fred A. Seaton, stated when releasing the annual Bureau of Mines preliminary production report for the year. The 1956 value was \$17,500,000,000.

Primary aluminium production in 1957 was 1,650,000 tons, approximately the same as in 1956, the Bureau reported. By the end of the year installed capacity for the production of primary aluminium in the United States was 1,840,000 annual tons, an increase of 63,000 tons during the year.

Domestic output of *bauxite* in 1957 was estimated at 1,500,000 long dry tons, a 14 per cent drop from 1956. United States production in 1957 accounted for an estimated 18 per cent of the total new supply for consumption, compared with 23 per cent in 1956. Imports of *bauxite* are estimated at 6,700,000 long dry tons, an increase of 18 per cent over 1956. Haiti was a new producer in 1957 and supplied about 5 per cent of total imports. Jamaica supplied 48 per cent of the imports, Surinam 41 per cent, and most of the balance came from British Guiana. The total new supply for consumption, about 8,200,000 tons, was up 11 per cent from 1956.

*Magnesium* was the only structural metal obtained almost wholly from sea water in the United States. Primary production rose to 81,000 tons in 1957, 17 per cent above 1956.

The *titanium* sponge metal industry operated at a record high level during the first quarter of 1957, then production and consumption rates fell off due to a reduction in military requirements. Nevertheless, the Bureau estimates that 1957 output exceeded that of 1956 by 20 per cent, totalling about 17,500 s.tons. Sponge consumption was about 20 per cent below 1956, dropping to an estimated 8,500 s.tons.

Domestic *ilmenite* production increased markedly to achieve a new high estimated at 710,000 s.tons. Rutile output remained near the 1956 level of 12,000 s.tons. Ilmenite imports, including *titanium slag*, were 352,488 s.tons during the first nine months of the year, a 32 per cent increase over the corresponding period in 1956. Imports of *rutile* in the first nine months were 66,083 tons, exceeding like receipts in the previous year by 76 per cent and setting a new record.

Because of the increase in production of *titanium* sponge metal, consumption of *rutile* in 1957 probably would be greater than 1956, the Bureau predicted. However, *ilmenite* consumption undoubtedly would be lower due to an anticipated drop in output of *titanium dioxide* pigments.

### Trends in Other Metals

Production of recoverable *copper* from domestic mines decreased nearly 5 per cent from 1956; refinery output remained about the same and consumption of refined copper fell approximately 15 per cent. Total imports of copper rose about 6 per cent and exports of refined copper almost doubled. Stocks of refined copper jumped nearly 65 per cent.

*Manganese ore* production in the United States for 1957 was at approximately the same rate as for the previous year, but rates of imports and consumption were both noticeably higher. The beginning in January of regular shipments of high-quality ore, in quantity, from Brazil was the most significant development of the year.

Domestic production (shipments) of *chromite* in 1957 was about 25 per cent below 1956, due largely to completion of the programme to upgrade low-grade ore and concentrate produced in Oregon during World War II. Industry stocks of both *chromite* and *chromium* products rose during the year. Imports and domestic production of *chromite* were both estimated to have declined about 5 per cent.

### Supply and Demand

The supply/demand position of *nickel* for civilian needs in 1957 was much improved over 1956 because virtually all scheduled shipments to the national strategic stockpile were diverted to industry. Due to the improved supply position, stocks (48,000,000 lb.) held by consumers on September 30 were 89 per cent greater than at the beginning of the year. Domestic production of recoverable *nickel* increased about 3 per cent to 9,000 s.tons in 1957, but equalled only 7 per cent of consumption, which at about 128,000 tons, held the 1956 level. Imports are estimated at 150,000 tons in 1957, up 5 per cent from 1956.

Government purchase of domestic *tungsten concentrate*, suspended in December of 1956, was not resumed in 1957 because funds were not provided. Domestic production till end-June was equal to about 60 per cent of the half-year output of 1955 and 1956, but accumulating stocks and falling prices forced closure of all except four or five mines by December. Total production for the year was 3,650 s.tons of contained *tungsten* (458,000 s.ton units of *tungsten trioxide*) about 50 per cent of the preceding year's output. Value of domestic production, because of lower prices and lower output, were estimated at \$12,800,000, only about 25 per cent of the 1956 value.

Domestic production of *molybdenum* grew in 1957, but shipments of concentrate decreased compared with the previous year. Consumption of concentrate dropped, but exports were higher than in 1956.

Foreign output of *columbium-tantalum mineral concentrates* was estimated to have fallen 38 per cent in 1957, the Bureau reported, due to halted United States Government purchasing of foreign ores for the stockpile. Domestic ore production is estimated to have tripled.

United States *beryl* production in 1957 is estimated at 460 s.tons, the same as 1956. Until end-September, 1,581 s.tons of domestic *beryl* had been purchased for the national stockpile through the domestic *beryl* purchase programme. The Defence Minerals Exploration Administration continued to encourage exploration for *beryl*.

*Germanium* made important advances in the electronics field in 1957 as wider applications of *germanium* transistors were introduced by industry. The supply of domestic *germanium*, plus imports, was adequate to meet the increased demand for the metal.

Domestic consumption of the *rare-earth metals* for 1957 is estimated at 3,500 tons of *rare-earth oxide*, about the same as for 1956. Surplus quantities were available largely as a by-product in the processing of *monazite* for *thorium*.

Shipments of *selenium* fell off sharply during 1957, but production continued at a near record pace. As a result, producer stocks steadily climbed to an all-time high. Two major price decreases during the year failed to ease buyer resistance. Imports declined and quantity controls were removed from exports during the year. The use of *selenium*

in rectifiers and other electronic applications continued to absorb more than half the metal consumed in 1957.

The four major producers of *zirconium* metal (Carborundum Metals Co., Columbia-National Corp., United States Industrial Chemicals Co., and the Wah Chang Corp.) began building production toward an average contract quantity of 1,250 tons a year. Capacity in excess of this figure has been installed to provide for demand for high-purity metal for private reactor construction, and for commercial-grade metal for non-reactor use.

Despite the increased demand for zircon for metal production, total 1957 shipments of zircon were predicted to be less than in 1956, due principally to reduced demand from the foundry trade. Imports from Australia, tied principally to the faltering rutile market, also probably would be below the 1956 figure. Brazilian Government export regulations almost stopped the trade in zircon-bearing ores from Brazil.

#### Lead and Zinc

Both mine production and commercial consumption of *lead* declined about 5 per cent in 1957, according to the Bureau. *Zinc* mine production dropped about 6 per cent, and consumption about 8 per cent. The values of the lead and zinc mine output declined around 11 and 20 per cent respectively. Imports of both metals were estimated to have exceeded the high levels of 1956.

Until end-April, domestic mine production and imports of lead and zinc were at higher rates than in 1956. In these four months smelter stocks of refined lead increased 35 per cent and zinc stocks rose 58 per cent. Early in May the prices of both metals, which had been stabilized for 16 months by good commercial demand and government acquisitions for the national stockpile, began to fall. The price of lead dropped from 16 c. per lb., New York, to 13.5 c. by October 14 and that of zinc, Prime Western grade, East St. Louis, dropped from 13.5 c. to 10 c. per lb. by July 1. Many mines were closed and others curtailed production. In September output of recoverable lead hit the lowest level in nine years and that of zinc was the lowest recorded since the Bureau began reporting monthly mine production in 1941.

The government continued to purchase domestically-produced lead and zinc on a monthly basis for the national stockpile throughout 1957. The government barter programme, under which foreign lead and zinc were acquired for the supplemental stockpile, was greatly restricted at the end of April. On September 27 the Emergency Lead and Zinc Committee, representing the lead and zinc industry, filed a petition with the Tariff Commission asking for relief under the "escape clause" provisions of the Trade Agreements Extension Act of 1951.

The output of 31,000 flasks of *mercury* at domestic mines was the highest in any peacetime year since 1904. Production rose for the seventh consecutive year and surpassed 1956 by nearly 30 per cent, according to the Bureau's figures. Industrial consumption remained high and exceeded slightly the 54,000 flasks of the preceding year. General imports dropped sharply in the last half of the year to fall more than 15 per cent below the 52,000 flasks imported in 1956.

Domestic production of both *gold* and *silver* is estimated to have declined moderately in 1957, reflecting, principally, lower production of base-metal ores yielding by-product gold and silver. Output from straight gold mines continued to decline as several operations were forced to close due to rising costs and ore depletion. Total 1957 gold production was estimated at \$62,000,000, smallest in 12 years, and silver at \$34,700,000.

## AEROFALL MILL AT MANGULA MINE, S. RHODESIA

**T**HE mill at Messina's Mangula Mine is now running, though as yet on an experimental basis. It is at present putting through 1,500 tons per day, and it is hoped to increase this figure to 1,700 when adequate coarse feed becomes available. The development rock going through contains only a small percentage of the 12-in. material necessary for efficient functioning.

The plant is designed for duplication throughout. The Aerofall allows for extremely clear design, and the whole installation is an example of modern design planning. In any plant modifications are liable to be necessary, and at Mangula this need not prove difficult; as there is ample space even the power cables have been given a floor of their own.

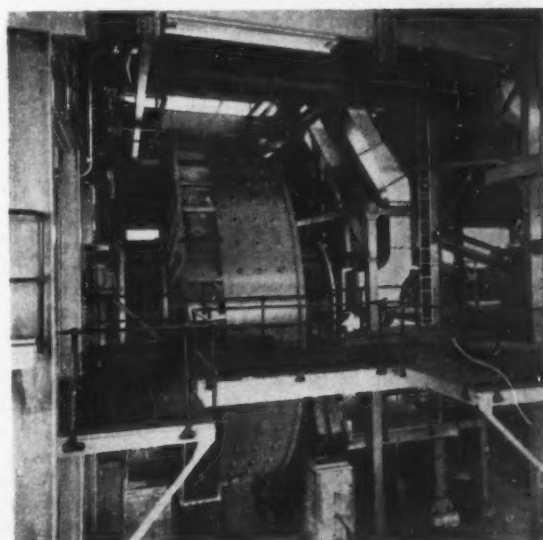
The mill is 30 ft. in dia. and 5 ft. wide, and is thus the largest size made. It weighs 350 tons and carries a live crushing load of some 70 tons round at 14 r.p.m. just below the critical speed. The drive motor is of 1,250 h.p. while the fan has a capacity of 120,000 c.f.m.

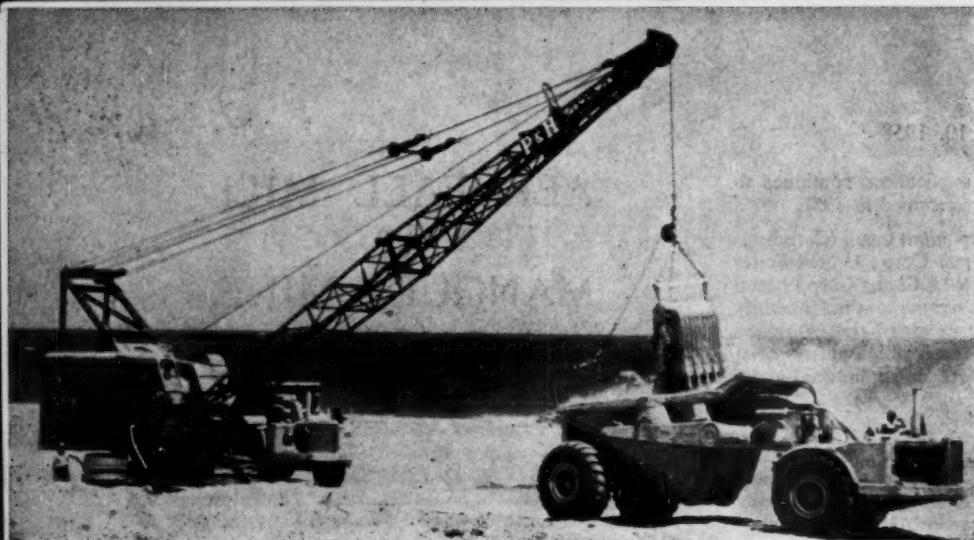
The Aerofall principle may not be generally known. It is a dry process using air classification. Comminution takes place by abrasion, blow impact, free fall and attrition through drag. A light load of steel balls is here used on account of the hard nature of the Mangula ore.

Control is fully automatic and under the care of one shiftman who is able to read the entire picture from a battery of lights, recording meters and dials. The feed itself is regulated by sound monitor, though the mill itself seems to make less noise than the jet burners used to control moisture in the intake air.

Costs of installation and maintenance are not yet available. It is anticipated that an official opening will take place shortly.

Side view of the Aerofall mill taken across the bay built to house the second unit





A P. and H. dragline loads a Cat DW21 and Athey PR21 combination with shell for preparing a storage area for Southern Peru Copper Corp. at Ilo, Peru

**I**N Southern Mexico, where this country narrows to its smallest width before broadening out into the Central American region, diesel power is causing the development of new sulphur industries. In the Isthmus of Tehuantepec, some 170 miles southeast of the City of Veracruz, lies the town of Minatitlan, the centre of the sulphur-producing area which is helping to alleviate the increasing world demand for this chemical.

One of the major suppliers in the area is the plant of Cia. de Azufre Veracruz, S.A., designed to produce 300,000 tons of sulphur per year. With small additional capital investment, this capacity can be increased to over 500,000 tons annually.

Because of its geographical location, the region lacks the physical development found in more progressive areas. It would thus appear that the sulphur found in the porous limestone might be difficult to obtain, but diesel power makes such an endeavour possible and also profitable.

The company uses two Caterpillar D6 tractors with dozers to pioneer roads and to perform land-clearing operations. A D7 track-type tractor and a Caterpillar motor grader are also used in the pioneering and maintenance operations.

Since sulphur is found in the porous limestone, the company uses the Frasch process for extracting the chemical. This requires drilling wells as in oil field operations, and forcing super-heated water under pressure into the wells, melting the sulphur and freeing it from the limestone. The molten sulphur is then forced to the surface in liquid form, piped to transportation facilities, allowed to solidify in storage vats, and is then crushed, weighed and loaded for delivery. Two shovels—a Bucyrus Erie and a P. and H.—are used in the operation, both powered by Caterpillar diesel engines.

The largest earthmoving project in Italy is well underway outside Castelnuovo de Sabbione. There are more earthmoving machines at work on the job of stripping overburden from the new lignite mine site there than on any other job in the country.

Costruzioni Alta Italia has a total of 26 machines and 75 operators working 24 hours a day to prepare the mine. The heaploaded Caterpillar DW21 scrapers have a haul of 650 m., with a 5 per cent adverse grade. The return trip is 800 m. long with 300 m. of 3 per cent favourable grade. The pit will measure 1½ kilometres by 3 kilometres and contains a deposit of lignite estimated to last about 18 years. To uncover the 120,000,000 m. of lignite it will be necessary to move 7,000,000 cu. m. of overburden in a period of two years.

After the deposit is uncovered, huge Krupp and Jenkoff belt excavators will dig the lignite, and later these same belt loaders will transport the lignite to a new thermo-electric plant. This thermo-electric plant is planned to be

the largest and most modern in Europe. Two more of these plants are already operating successfully in Germany; this one will be the third.

Costruzioni Alta Italia is one of the largest earthmoving contractors in Italy and has worked on such projects as building protective levees along the Po River, the earth-filled dam at Lavelle (Potenza) and the airport at Practica de Mare. In addition to the ten Caterpillar DW21s, C.A.I. also has one Caterpillar D9 tractor pushloading, two Cat No. 12 motor graders, three HD20s, one TD24, plus eight other machines, including a water wagon, at work.

## Crawling

As part of a programme to expand available coal production, the National Coal Board let contracts in October, 1956, to strip overburden and exploit coal deposits at the Watson opencast site, near Heath, in Chesterfield. Watson's coal, a high-grade bituminous, falls in three seams; the main seam 4 ft. thick and two smaller ones, 12 in. by 9 in. All of the seams are located under an average 200 ft. of clay overburden which must be removed to expose a 15-ft. thick seam of hard sandstone which lies directly on top of the coal.

B. Y. Jackson and Son, Ltd., is clearing the site on a subcontract from the N.C.B.'s main contractor, Taylor Woodrow, Ltd. To pull out the overburden, Jackson is operating three Caterpillar DW21-No. 470 tractor-scraper units. Pushloaded by a Cat D9 tractor and a D8, the DW21s strip the overburden down to the stone seam on top of the coal. Shovels then take over when the seam is uncovered, loading the shot stone into dump trucks for the haul to the spoil dump. At one point, the rock faults, creating two levels which have to be cleared before the shovels can be moved in. Two other Cat D8 tractors and a D7 handle spreading of the spoil at the dump area as well as general work about the mine, including haul road building and maintenance.

To date, about 1,250,000 cu. yd. of overburden have been taken from the Watson site by the DW21s. Production by the units has been at the rate of about 5,000 yd. per 10-hr. day, working a seven-day week. With the coal seam in full production, the Watson site is expected to produce an average of about 5,000 tons of coal per week. The present contract is for five-years' operation, producing a total of

Through the foliage and undergrowth in Southern Mexico a Caterpillar D6 tractor with 6A dozer carves out a road to expedite sulphur production in this area



800,000 tons, of which 140,000 tons have already been removed.

The Michel Picavet construction firm, Brussels, is building a new quarry road for the Lhoist quarry in Jemelle, Belgium. The road is to be over three miles in length and 32 ft. wide. About 52,000 cu. yd. of clay and rock had to be moved to form the roadbed, the highest fill being 25 ft. and the cuts in the rocks 12 to 15 ft. A total of 55,000 cu. yd. of quarry tailings were used as the road sub-base. Over this was laid 24 in. of crushed stone which was compacted before the base of 8 in. of fine rock-sealing

duction (which will be in the future) an additional large expenditure will be required.

Initial construction operations for this project began with amphibious landings of equipment at Ilo, Peru. This was necessary since freighters could not unload on to a pier.

A total of five Caterpillar DW21 and Athey PR21s, one Cat D9 tractor, two D8s, one Cat No. 12 and one Cat No. 112 motor grader, two Caterpillar diesel D318 electric sets and one Caterpillar No. 955 traxcavator were disembarked for building port facilities. The port will have a dock capable of serving ocean-going vessels

## Around the World

material was applied for the final layer. The road was finished with 2½ in. of asphalt carpet.

Picavet used four Caterpillar DW21 scrapers to move the earth for the roadbed. In addition, six Caterpillar D8 tractors, two Cat No. 12 motor graders, two La Plant-Choate TS-300 scrapers and a Warco grader took part.

Development of extensive copper deposits is now getting underway in the Toquepala district near Ilo, Peru. Rugged pioneering marked the first phase of preparation for establishing mining operations. Unloading of machinery was accomplished by amphibious landings—currently, a modern port is being built to handle ore shipments.

In addition to providing extensive mine processing equipment on the site, large-scale earthmoving for removal of millions of tons of earth above the ore will be necessary. This huge mine and two sister mines, the Quellaveco and Cuajone, represent one of the largest known copper deposits in the world.

Southern Peru Copper Corp. has been formed by American Smelting and Refining Co., Cerro de Pasco Corp., Newmont Mining Corp., and Phelps Dodge Corp., to operate the open-pit mining operations. All capital stock in S.P.C.C. is owned by the above corporations.

In November of 1954, the Export-Import Bank approved a \$100,000,000 loan for getting the Toquepala project underway. In addition, another similar amount has been set aside by the participating companies for the same purpose. This total amount of \$200,000,000 will be spent only for bringing the Toquepala deposit into production. It is estimated that to bring the other two mines into pro-

The Toquepala mine, estimated to contain over 400,000,000 tons of low-grade ore, is expected to produce 140,000 tons of blister copper annually for a period of ten years. In the same district, the mines of Quellaveco and Cuajone are estimated to contain 200,000,000 and 500,000,000 tons of ore respectively. These three orebodies contain over 1,000,000,000 tons of ore running approximately 1 per cent copper.

Before any actual copper production is realized some 126,000,000 tons of overburden must be removed from the Toquepala mine. This phase is expected to take four and a half years of work around the clock. Electric power shovels will dig out the overburden and load it into off-the-road hauling units. Haul lengths will vary from 5,000 to 8,000 ft. one way.

Besides the removal of overburden, a smelter, steam power plant, concentrator, roads, railroads, homes and other facilities must be completed. A temporary diesel power plant of 6,475 kW. must be provided. This power plant will supply initial power for the electric shovels. Transmission lines and sub-stations must also be constructed. Power will be transmitted at 115,000 v.

Plans have been developed for a standard gauge railroad approximately 130 miles long through extremely rugged country to connect the concentrator with the port. The railroad must be built to traverse a straight-line distance of only 56 miles. Water must be transported by pipeline and aqueduct. The water source lies approximately 50 miles from the Toquepala mine. A storage reservoir of several days' capacity will be provided for emergency purposes.

**T**HE rocket jet principle used to power modern jet aircraft and missile weapons is now being put to industrial use. On the St. Lawrence Seaway project, blast holes are being sunk in rock with a flame process made by the Linde Department, Union Carbide Co. This process is known as Jet-Piercing.

The new process works on the rocket principle and makes it possible to pierce rocks at speeds up to ten times faster than by conventional drilling methods.

A group of Canadian contractors is using Jet-Piercing on the St. Lawrence project, where the \$U.S.14,000,000 contract involves the removal of 3,000,000 tons (2,721,000 tonnes) of rock on the Upper Beauharnois Lock near Melochville, Quebec. The illustration shows the Jet-Piercing rig now being used on the Seaway. It is a modified churn drill rig.

Intensely hot, supersonic jets of flame are the key to the new process. Travelling five times faster than the speed of sound and reaching temperatures of 4,000 deg. F. (2,190 deg. C.), the flame spits out of a rocket-type burner and disintegrates or spalls the rock in its path. This is a continuous operation. Disintegrated rock particles are thrown up out of the hole by the combined force of burning gases and steam so that a fresh surface is continually exposed to

## Jet-piercing

## Hard Rock

the jet flame. The only limitation to penetration depth is the length of the hoses (carrying fuel, oxygen and water) that are lowered into the hole. Deepest penetration obtained to date is 160 ft.

The jet flame is said to represent one of the highest concentrations of energy available to man. At its highest velocity, the Jet-Piercing flame has a mechanical energy equivalent of about 500 h.p.—yet this energy is contained in a flame not more than 18 in. long and 2 in. wide.

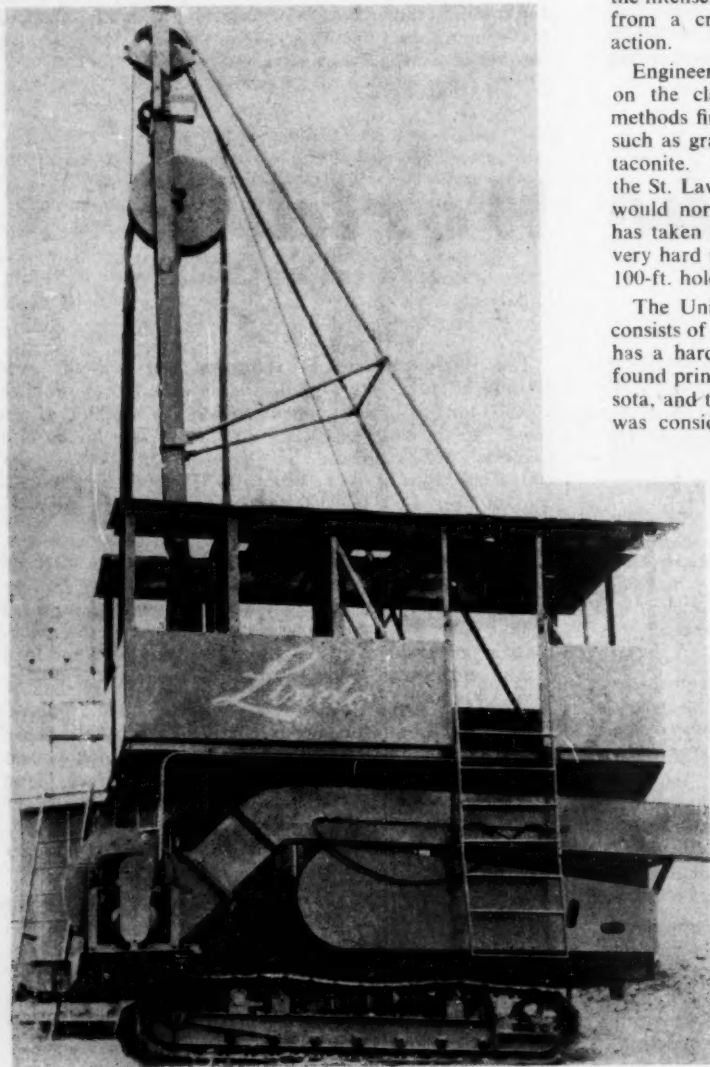
Low viscosity fuel oil or a liquid hydrocarbon fuel such as kerosene is combined with high-purity oxygen to produce the intensely hot Jet-Piercing flame. A blowpipe suspended from a crawler carrier controls flame combustion and action.

Engineers have found that the new process works fastest on the class of spallable rocks which normal drilling methods find toughest—especially those containing silica—such as granite, syenite, quartzite, sandstone and magnetic taconite. Potsdam sandstone, the rock being pierced on the St. Lawrence Seaway, is a highly abrasive material that would normally cause excessive bit wear. In the past it has taken as long as a week to drill a hole 100 ft. in this very hard rock using churn drills. But with Jet-Piercing, a 100-ft. hole can be sunk in a single shift.

The United States' largest reserve of domestic iron ore consists of iron-bearing ore formations of taconite. Taconite has a hardness capable of scratching glass. This rock is found principally in the Mesabi Range of Northern Minnesota, and throughout Northern Michigan, and at one time was considered almost impossible to mine. Blasting was the only possible method, but blast holes could not be drilled economically. In fifteen minutes the strongest steel drill would get only three inches down into the tough taconite before being ruined. But blasters needed thousands of holes at least 18 ft. deep in order to blast out the stubborn but iron-rich taconite.

The new jet process opened up the taconite-rich Mesabi Range and made it possible to produce blast holes at 40 ft. an hour. By the use of Jet-Piercing, it is now estimated that in less than 20 years over one-third of the United States' iron ore requirements will be supplied from taconite.

In addition to the increased speeds of penetration, Jet-Piercing makes it possible to chamber blast holes. Chambering consists of enlarging the blast hole at any desired depth so that extra explosive charges can be placed exactly where needed. The operator simply lifts the blowpipe off the bottom of the hole and lets the jet blast away. This induces more spalling at the desired spot and produces a bottle-shaped cavity, capable of holding a larger explosive charge.



## Machinery and Equipment

# SAFETY IN SHAFTS

Recommended safety standards for sinking mine shafts have been issued by the United States Bureau of Mines to curb explosions, fires, and other accidents during shaft-sinking operations. The Bureau's attention was focused on the problem by the lack of definite, uniform standards to guide those seeking to sink a mine shaft safely.

The recommended standards were compiled by Bureau engineers and safety experts familiar with various shaft-sinking operations. Applicable State rules were considered and included, and representatives of the mineral industries, coal and non-coal, were consulted.

Made available in a Bureau publication, the standards are grouped under a dozen main headings, namely fire prevention, fire protection, housekeeping, illumination and sanitation, electricity, explosives storage and transportation, timbering and safeguarding personnel and equipment, hoisting, hauling, and handling excavated material, ventilation, drilling, blasting, welding and burning, and lighting.

An appendix discusses equipment that should be available for fighting the three types of fire likely to be encountered during shaft-sinking activities.

### TUBULAR AIR CROSSING

A sectional tubular air crossing for underground ventilation systems has been designed in the East Midlands Division's No. 6 Area, N.C.B.

The crossing was designed to eliminate crossings of brick and steel construction, and although it is not intended as a temporary installation, when work in one

district is completed it can be dismantled and the sections used for similar installations elsewhere.

The sections are constructed of steel plate  $\frac{3}{8}$  in. thick; they are faced with flat steel 2 in. by  $\frac{1}{2}$  in., drilled for  $\frac{1}{2}$  in. dia. bolts to secure the sections together. A foam-rubber packing provides an airtight seal. All sections are identical and interchangeable, and this allows considerable flexibility in the shape of the crossing which can be constructed from them. All attaching bolts are positioned inside the tube to give better protection against corrosion.

In cross-section, the dimensions of the tube are 5 ft. by 4 ft. Sealings at either end are by means of stoppings of brickwork or sandbags.

### A NEW LOADING SHOVEL

Although no specific claims have been made by the manufacturers, F. E. Weatherill Ltd., it is believed that their 10H-type Mobile Loading Shovel, produced early in 1957 but not previously announced, may be the largest machine of its type at present actually manufactured in Great Britain.

Be that as it may, several industries with bulk handling problems calling for a noticeably greater output than can be provided by loading shovels of normal size have already taken up this machine, with its extremely useful 2-ton loading

capacity and with scoop sizes ranging from  $1\frac{1}{2}$  to 3 cu. yds.

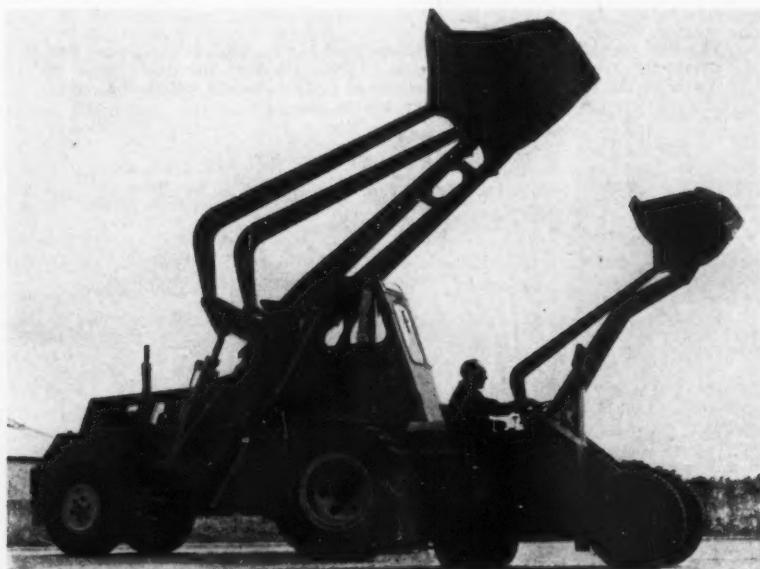
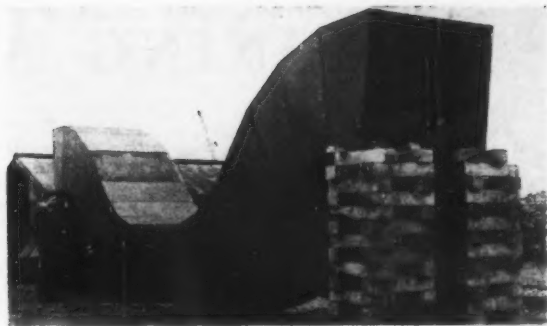
In cases where it may be impossible or inconvenient to put additional machines on to a job to achieve increased output, the 10H-type Weatherill Hydraulic provides the logical answer. In addition to such refinements as power-assisted steering fitted as standard equipment, a noteworthy feature of the 10H machine is a patented scoop crowd action which provides automatic or operator-controlled crowding to suit the circumstances of the particular job. This unique scoop control system also gives, if required, automatic levelling of the scoop prior to commencing a fresh loading cycle. The primary duty is that of stockpiling.

The 10H Loading Shovel is a front-wheel-drive machine. Powered by a 58 b.h.p. diesel engine, adequate power and flexibility are available for the handling of a wide range of stockpiled materials as well as for a number of similar tasks.

### NEW BATTERY FOR LOW TEMPERATURES

The problem of producing a battery with a consistently reliable performance at very low temperatures is claimed as solved by Chloride Batteries Ltd. with the introduction of their new 6WXA-15ZR. Designed for engine starting and miscellaneous duties on armoured fighting vehicles, the battery can be artificially heated if necessary to ensure an extra high rate performance in low ambient temperature. It was originally developed to meet the requirements of military vehicles operating in extremely cold weather conditions. Its applications in northern mining regions are therefore obvious.

The unique feature of the 6WXA-15ZR, which allows it to be externally heated as desired, is its multi-compartment die-cast aluminium container lined with high-grade hard rubber. The battery can be heated by means of a hotplate or hot air, or even put on top of an oil stove. In fact, almost any method can be employed, except, of course, the direct use of a naked flame. The heating can be controlled by means of a thermostat, which may be attached to a special moulding in the centre cell connection.



Above: The sectional tubular air crossing for underground ventilation systems

Below: The new 10 H type 2-ton capacity Weatherill Hydraulic Loading Shovel with front wheel drive, shown beside the company's recently-introduced small industrial loader

# MINING MISCELLANY

It is reported from Melbourne that Broken Hill Pty. Co. Ltd. is planning to build more large vessels, including two 19,000-ton ore carriers for its own fleet.

A trans-Caribbean ferry service linking the new nickel-cobalt project at Moa Bay, Cuba, with its refinery and process material sources in Louisiana, will be inaugurated in 1959.

A "fairly promising" discovery of radioactive ore, which includes uranium and thorium, has been made in the Northern Province of Nyasaland, according to the Director of Geological Survey, Mr. J. H. M. McNaughton. Geologists of his department prospecting near Fort Hill found a strike near the surface at Lomba Hill, north of Fort Hill. A few specimens have been sent to Zomba and to Britain for further analysis.

Falconbridge Nickel Mines has been granted a one-year extension under its working-option agreement on the Junior Frood Mines properties in the Sudbury district of Ontario. Under the original option, Falconbridge was to spend \$500,000 on the properties to February 1, 1958. To December 1, 1957, almost \$300,000 had been spent. Since the balance could not be expended in the remaining period, Falconbridge requested an extension of the option period for a further year.

Expenditure of an additional \$8,500,000 on development of a potash mine in Saskatchewan, Canada, has been authorized by the board of International Minerals and Chemical Corp. An allocation of \$3,500,000 has already been made for the current fiscal year, and it is expected that the total cost will exceed \$20,000,000. The mine, for which a 3,000-ft. shaft is now being sunk about 150 miles east of Regina, is expected to be in operation in late 1959.

British Newfoundland Exploration, a wholly owned subsidiary of the British Newfoundland Corp., has announced that work done so far on its uranium prospect in Labrador might support mining operations of the order of 200 tons daily. The prospect is 125 air-miles north-east of Goose Bay. Drilling began early in September, 1957.

Mr. M. P. Monteiro, of Barroca Grande, Minas da Panasqueira, Portugal, has been granted a concession to prospect for minerals in Portuguese East Africa. The concession excludes prospecting for mineral oil and radioactive minerals and calls for the formation of a company with a minimum capital of £18,000 within a period of six months.

By December 29, 1957, Poland's collieries had implemented the national plan. At the end of the year output amounted to 94,000,000 tons, exceeding the planned total by 1,000,000 tons. This is the first time for some years that the coal industry has implemented its yearly plan ahead of schedule.

Kennecott Copper is negotiating for the purchase of all the Consolidated Coppermines Corporation's copper-

mining properties in Nevada. The latter company has been producing about 18,000 tons of metal annually from three properties, two of which have been operated jointly with Kennecott.

It was recently announced that deposits of uranium ore with the unusually high content of 16 per cent of uranium oxide had been discovered in the Province of La Convencion, in the Department of Cuzco, Peru. Fuller details are lacking.

A new Government-sponsored undertaking, the National Salt Corporation, is to operate the existing salt industry in Ceylon. It will implement a new scheme for the manufacture of 500,000 tons of salt and gypsum annually at Hambantota in the south, the estimated capital cost of the project being Rs.14,000,000.

According to the Indian Minister for Industry, Mr. Manubhai Shah, tentative proposals for the setting up of an aluminium plant at Mettur in Madras State have been received from a French company. The firm has offered broad terms of deferred payment.

The Indian Government has decided to regulate the export of kyanite on a quota basis during 1958. Quotas will be issued to shippers on the basis of their best year's exports during 1954, 1955 and 1956. The Government has also decided to allow exports to be made by the State Trading Corporation on an *ad hoc* basis against contracts concluded by it.

Press reports from Cairo state that plans are in preparation to exploit deposits of copper ore which have been found in several districts. At present, the country is spending some £E.1,250,000 annually on imports of manufactured and scrap copper. Recent discoveries of copper ore in the Sinai Peninsula are stated to be substantial, but it is expected that prospecting will not be completed for another two years.

Mr. Mokoto Watanabe, deputy leader of a Japanese team which has arrived in India to examine the possibility of increased supply of Indian iron-ore to Japan, is reported to have stated that Japan proposed to step up iron-ore imports from India from the present level of 1,300,000 tons to 6,300,000 tons.

Consolidated Diamond Mines of South-west Africa has appealed against the decision of the South-west Africa High Court to dismiss the company's application for mining rights along a 180-mile coastal strip. The company claims that the strip, running between the high- and low-water marks, and extending from Oranjemond to Luderitz, was included in mining rights it held over the coastal area.

## PERSONAL

Mr. A. Wilson has joined the board of the New Jagersfontein Mining and Exploration Co. Ltd.

Mr. C. D. Howe, formerly Canadian Minister of Trade and Commerce, has been appointed a director of Rio Tinto Mining Co. of Canada Ltd.

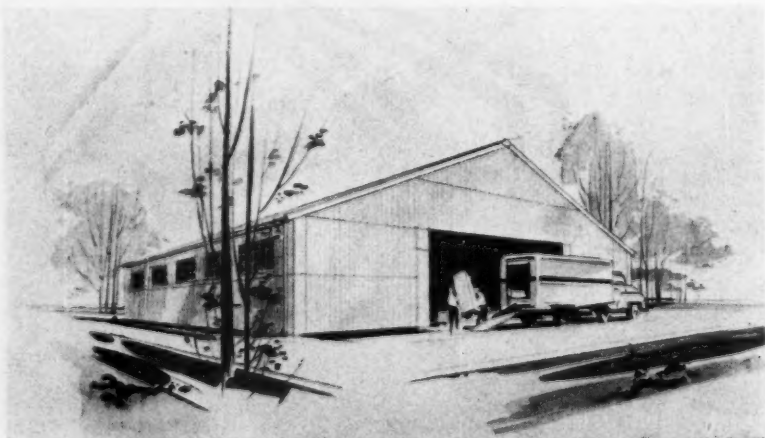
Mr. Christopher Collaro and Mr. A. W. M. Hartley have joined the board of Camp Bird Ltd., the parent company of the Camp Bird group.

Mr. Eric Wilson has been appointed general sales manager to Camp Bird Industries Ltd.

A former secretary of the Institution of Metallurgists, Dr. A. D. Merriman, has been appointed consultant on scientific projects to Edgar Allen and Co. Ltd., steel manufacturers and engineers, of Sheffield.

The United Nations Technical Assistance Administration has appointed Mr. Donald J. Gear to assist the Geological

The new range of steel-framed buildings, supplied by Sanders and Foster Ltd., covers the requirements of the main climatic zones of the world from the Arctic to the tropics. The applications of these buildings within the mining industry are obvious



Department of the Ministry of Mines in Burma in carrying out a survey of the mineral resources of the country. He will undertake follow-up work in areas already covered by the Airborne Geophysical Survey and also the training of local staff in geophysical prospecting. Mr. Gear took up his duties in December. Before accepting this appointment, he served as geophysical adviser to the Geological Survey of the Gold Coast (Ghana) and earlier worked as a geophysicist with the Geological Survey of the Sudan and as a geologist with the Geological Survey of Uganda.

Mr. A. P. Wickens, managing director of Vickers-Armstrongs (Tractors) Ltd., has left Newcastle upon Tyne for Karachi, the first stop in a two-month business trip during which he will travel right round the world.

After 38 years as a director, Sir H. Cassie Holden, Bt., has resigned from the boards of Midland Bank Ltd. and Midland Bank Executor and Trustee Co. Ltd. He was a deputy chairman from 1948 to 1955.

Mr. J. D. Robbins has resigned from his position as managing director of Vivian, Younger and Bond, Ltd., in order to devote his full-time services to the British Metal Corporation, Ltd. Mr. J. H. Mason has been appointed managing director of Vivian, Younger and Bond, Ltd. Mr. J. D. Robbins will continue to be a director.

Mr. W. T. Vizer-Harmer, at present director and commercial manager of Steel, Peech and Tozer (branch of the United Steel Companies, Ltd.), has been appointed commercial director of the branch. He will be succeeded as commercial manager by Mr. J. Mackenzie-Mair.

Mr. J. E. C. Bailey, chairman and managing director of Baird and Tatlock (London), Ltd., and Hopkin and Williams, Ltd., is leaving the United Kingdom on January 18 to visit the companies' branches, agents and representatives in Rhodesia, South Africa, Australia, New Zealand, Singapore and Ceylon.

Mr. E. D. Nicholson, secretary, and Mr. A. S. Watts, Southern Area manager, of British Ropes, Ltd., have returned from a business visit to Mexico and the United States. In Mexico, they carried through the negotiations to form a new company—Cables Mexicanos S.A. de C.V.—which will shortly start the manufacture of steel wire ropes in Mexico City. The new company will have as its general manager Mr. J. M. Downton, who has until recently been ropery manager at the Retford plant of British Ropes, Ltd.

On December 27, a four-man team of technical experts left the Scotswood (Newcastle upon Tyne) works of Vickers-Armstrongs (Tractors) Ltd. on the first leg of a six-month Commonwealth tour. This factory team (the first of its kind) will visit overseas dealers and users of Vickers' tractors and Vickers Onions equipment. Led by a senior company official, Dr. B. F. Willetts, they will deal with all aspects of operation, repair and maintenance, and give practical demonstrations. The itinerary takes in South Africa, Malaya, Australia, Tasmania, New Zealand and Canada.

The Royal Society of Arts has awarded the Fothergill prize of £20 for fire prevention or fire-fighting to Philip B. Smith for his essay recording "A New Method of Suppressing Fires in Mines". The essay was published in the *Journal of the Royal Society of Arts* for October 25, 1957 (page 938).

General meetings of the Institution of Mining and Metallurgy in the session 1957-58 will be held on January 16, February 20, March 20, April 17 and May 15 (annual general meeting from 4 p.m.). The annual dinner of the Institution will be held at Drapers' Hall, Throgmorton Street, London, E.C.2, on May 5.

## COMPANY EVENTS

Negotiations for a merger of the Yorkshire Copper Works Ltd. with the corresponding section of the Metals Division of Imperial Chemical Industries have been virtually completed. Proposals to be submitted to shareholders of Yorkshire Copper Works on January 27, 1958, envisage the formation of a new company, Yorkshire Imperial Metals, the share and loan capital of which will be owned 50 per cent by Yorkshire Copper and 50 per cent by I.C.I.

The proposal to merge Climax Molybdenum Co. and American Metal Co. into American Metal Climax Inc. has been approved by stockholders of both firms at separate meetings. Shareholders of Climax will receive three shares of American Metal stock for each one of Climax, except for the 225,000 shares of Climax owned by American Metal, which will not be exchanged. Climax operations will be continued by Climax Molybdenum Co., a division of American Metal Climax.

The Geophysical Prospecting Co. Ltd. and Canadian Aero Service Ltd. have joined their technical skills and broad experience to offer a complete and integrated exploration service outside Canada for the oil and mining industries, and for governments seeking to advance development of national resources. Their capabilities include airborne geophysical surveys with magnetometer, scintillation counter and electro-magnetic detector, as well as magnetic, electric, gravimetric and seismic surveys. Other services are self-potential, geo-chemical, radioactive and geological surveys; electro-logging and structure drilling; resistivity surveys, soil studies and photo interpretation.

The formation of Engelhard Industries, through consolidation of nine American companies in the precious metals and precision manufacturing field, has been announced in New York by Mr. C. W. Engelhard, chairman of the new company.

The Presidium Board of the Sinai Mining Co. has negotiated an agreement with the Egyptian authorities relating to the sale of the entire undertaking to Egypt, thus clearing the title of the Egyptian company to the assets and securing a measure of compensation for the company. The agreement, which has yet to be ratified, provides for the sale by the company of all its assets in Egypt, less liabilities there, for £500,000 payable out of the net proceeds of the export of ore.

The West German concern, Stollberger Zink, has received permission from the Spanish Ministry for Industry to raise its

participation in Concesiones Mineras SA and Metalurgica del Sur SA to 45 per cent. Both these Spanish companies are exploiting bismuth deposits in the Province of Cordoba.

## CONTRACTS AND TENDERS

### Korea

The International Co-operation Administration (I.C.A.) has announced the following future procurement: Electrical apparatus for Government mine sub-station equipment at Chulam, value \$80,000 (P10/C89-21-468-6-70291). The contract period is 20/11/57 to 30/4/58 and the terminal delivery date 30/9/58. B.O.T. Ref. ESB/31217/57/ICA. Telephone inquiries to Chancery 4411, extension 354.

M. Mohammed Irfan, a soap-stone mine owner, Main Bazaar, Havalian, Hazara District, Pakistan, has been granted an ICA/SMAP allocation of Rs.30,000, and wishes to receive quotations from the U.K. for a grinding machine. Suppliers interested should write direct to M. Mohammed Irfan, notifying the U.K. Trade Commissioner, P.O. Box 287, National House, Bank Square, The Mall, Lahore, that they have done so. B.O.T. Ref.: ESB/31091/57. Telephone inquiries to Chancery 4411, extension 776 or 866.

An Australian subsidiary of a United Kingdom engineering firm, with its own factories and servicing depots, wishes to represent on an agency basis United Kingdom manufacturers of non-competitive products. This Queensland firm is well known in Australian mining, electrical, railway, and other circles. Manufacturers interested should write to "Australian Agency", Export Services Branch, Board of Trade, Room 745, Lacon House, Theobalds Road, London, W.C.1. The firm's sales manager will be visiting the United Kingdom in March. B.O.T. Ref.: ESB/30810/57. Telephone inquiries to Chancery 4411, extension 365.

## Obituary

### DR. J. T. WILLIAMSON

The death has occurred of Dr. J. T. Williamson, governor and sole director of Williamson Ltd., the company owning the mine he discovered in 1941 at Mwadui in north-western Tanganyika. He is believed to have left a personal fortune of more than £15,000,000. The Mwadui mine is eight times the size of the Kimberley diamond mine, employing 6,000 workers and producing £3,000,000 worth of diamonds per year. Conditions for the workers are reported to be the best in Africa.

Trained as a geologist at McGill University, where he took the degrees of Bachelor of Arts, Master of Science and Doctor of Philosophy, he worked on the staff of De Beers until 1934, when he left to prospect independently in Tanganyika. His faith in the existence of a really large kimberlite pipe and his discovery of the main pipe at Mwadui when his resources were running low, are among the greatest epics of the mining industry.

In 1946, Dr. Williamson rejected an offer of £5,000,000 to join the Diamond Corporation, but in the following year he agreed to join on the basis of a 10 per cent participation in sales. A new agreement was concluded in 1952.

## Metals and Minerals

# Titanium's Testing Time

After its meteoric progress as an engineering material, titanium—once acclaimed as the "wonder metal"—starts 1958 under a cloud which has darkened the bright future so confidently predicted for it.

The expansion, which continued without interruption for about twelve years, has been abruptly halted. The Bureau of Mines, United States Department of Interior, estimates last year's output of sponge titanium at about 17,500 net tons, roughly 20 per cent above the 1956 output. Sponge consumption, however, fell to about 8,500 tons.

The decline in production and consumption of titanium sponge started in the spring of 1957, and has been progressive. In the third quarter of the year, production was down 13 per cent from the previous quarter, while sponge consumption was 59 per cent lower. The production of sponge metal was over three times as great as consumption, most of the excess being delivered to the General Services Administration under the terms of Government contracts. The quantity of ingots consumed in making mill products was 62 per cent below the figure for the first quarter of the year.

The industry's troubles stem from reduced military needs for the metal and, in particular, from reduced orders for aircraft. Hitherto, B-52 bomber production has provided the largest market for titanium metal. There is a possibility that titanium alloys may be involved in the new accelerated missile programme, but the Thor and Jupiter rockets contain only small amounts of the metal. The view has been expressed that United States titanium mill output might dip to only 185 tons in the first quarter of 1958 compared with 2,248 tons a year earlier.

Failing the restoration of Government requirements to their former level, which appears highly improbable, titanium's future markets must be sought mainly in commercial fields, in which its competitive position will be largely governed by price. The current average price in the United States of \$10.55 a lb. is 30 per cent lower than in 1954. Mills still have satisfactory profit margins on sales to the Government, but they are accepting lower prices to attract new civilian customers. In some cases, titanium has been made available at cost to chemical processors. Still further price cuts would improve the outlook for the metal and doubtless the downward trend will continue, as technological costs are further reduced by technological advances or increased production. Meanwhile, vigorous market drives to find more civilian uses for titanium and its alloys can be anticipated during the current year.

## RUSSIAN DIAMOND DISCOVERIES

Russia's search for diamonds appears to be meeting with considerable success, for the discovery of another rich field in the far north has been announced. By the end of 1956, more than twenty kimberlite pipes were reported to have been

discovered in the Western Yakutia province of Siberia, and further finds were made last year. The top layers of the Mir pipe are said to yield more than two carats of diamond per cubic metre of matrix. Last year, it was claimed that two of the six diamond fields known to exist in the Yakutia area would yield millions of carats and were capable of satisfying the demands of Soviet industry for some years to come.

If the new fields are indeed as rich and extensive as the reports indicate, it may be anticipated that no time will be lost in setting up a diamond-cutting and processing industry in eastern Siberia to alleviate a deficiency which might be termed the Achilles Heel of Russian industry. It is claimed that at least one of the recently discovered fields has all the prerequisites for becoming the centre of a diamond industry.

Assuming that diamonds are available in Siberia in payable quantities, it will be some time before mines can be developed, diamond-cutting works laid down, and specialists trained. Siberian diamonds do not, therefore, present any immediate threat to the trade. By the time Russia has succeeded in building up a diamond industry on a significant scale, the world's requirements may well have risen sufficiently to compensate for any reduction in Soviet purchases from the Central Selling Organization or elsewhere.

## WOLFRAM'S FURTHER DECLINE

Still lower values are indicated in the United Kingdom wolfram ore shipment market, the current range of 90s. to 95s. per 1 ton c.i.f. Europe representing a fall of 2s. 6d. from previous levels. The continued availability of Bolivian supplies remains a depressing factor, since many other producers are reported to be unwilling to press sales at the prevailing levels.

## MAGNESIUM'S PROSPECTS GOOD

Discussing the outlook for magnesium in the United States this year, a report by Mr. Milton E. LeFevre, of Dow Chemical Co., released by the National Association of Purchasing Agents, states that sales will depend in a large measure on defence moves, but increased demand in certain fields is expected to continue to provide a good level of consumption. Despite the mid-year defence "stretch-out" and the general slowing of the economy, consumption in 1957 was only about 5,000 tons lower than the 1956 figure of 55,000 tons. This year it is likely to improve.

In the military field a tripled consumption is anticipated for magnesium-thorium alloys. Increased demand is also likely to result from the Army's new emphasis on lightweight vehicles. The aircraft-missile industry continues to be the major consumer of magnesium in the structural field. A good example of increasing non-military use is in magnesium

tooling plate. About 750 tons of this relatively new product was sold last year, and an increase of 25 per cent is expected for 1958.

Owing to the credit squeeze, a plan to erect a £1,000,000 plant at Hopton, near Wirksworth, Derbyshire, to extract magnesium from limestone deposits has been postponed. Magnesium Elektron, of Swinton, Manchester (controlled by the British Aluminium Company) planned to erect the plant.

## LITHIUM CHEMICALS

Prices in the United States of a number of lithium compounds have been reduced by American Potash and Chemical Corp.—an important supplier of the Atomic Energy Commission. In the case of lithium carbonate, the reduction is from 73 cents to 67 cents per lb. in carload lots, effective January 1.

Géomines has ceased production of lithium carbonate, its experimental programme having been completed. The company is now considering the possibility of granting licences to use its process for the production of the carbonate, and is studying methods of applying the same process to the production of lithium salts other than the carbonate.

## NEW ROCKET FUELS

Pacific Coast Borax Co., a division of U.S. Borax and Chemical Corporation, recently announced that its borax prices would be advanced approximately 5 per cent on January 1, 1958. Borax is in strong demand for boron chemicals, which have many uses outside the field of high-energy fuels, perhaps their largest potential outlet. In addition, consumption of borax has been growing steadily in the ceramic, glass, and porcelain enamel industries.

A new rocket fuel, which in effect will lock the most efficient practical chemical propellant—a boron-carbon-hydrogen compound—in solid form, is being developed by Callery Chemical Co., a United States company that has pioneered in the field of liquid high-energy fuels. The significance of this development is that the most efficient type of chemical fuel is combined with the most efficient rocket design, since a rocket with solid propellant requires no fuel transfer mechanism.

Explaining the reasons behind the choice of boron for the new fuel, the company's research director, Dr. George Huff, said that review of possible types of high-energy chemicals had shown hydrogen, beryllium, lithium and boron compounds to be the only ones likely to produce energies significantly superior to hydrocarbon fuels. Molecular hydrogen could be produced readily, but since it is normally gaseous, very low temperatures would be required to store it as a liquid, and its density would be too low to permit use.

Beryllium was a more likely prospect, said Dr. Huff, but being scarce and also toxic, it should probably be conserved in the long run for atomic energy applications. Lithium was in a similar situation, except for toxicity. It might find a use in rocketry, but its use in conventional aircraft seemed both difficult and extravagant.

The company therefore concludes that boron is the logical element on which to base fuels. "It is available in large, concentrated deposits in the United States and has chemical properties which appear desirable from the chemical processing point of view."

#### AND NOW GALLIUM

Among the latest metals to attract attention is the little-known element, gallium. At the 26th Exposition of Chemical Industries held recently in New York, Alcoa showed intermetallic compounds of gallium which have generated interest in the field of electronics. Gallium arsenide and gallium phosphide have demonstrated interesting properties for use in transistors, diodes, rectifiers, and other semi-conductor devices.

Gallium will melt from the heat of a person's hand, but will not boil until heated to about 3,600 deg. F. Unlike most elements, it expands when it solidifies. Refinements in the processing method have enabled Alcoa to produce gallium of better than 99.995 per cent purity.

An article on germanium and gallium and their production from flue dust in the United Kingdom appeared in *The*

*Mining Journal* of April 14, 1950, pages 367 and 368. At that time so little gallium had become available for industry that commercial applications were virtually non-existent. One limitation to the potential usefulness of this curious metal may be the need to prevent it from solidifying, since its expansion on cooling is liable to burst the vessel in which it is contained.

#### MOLYBDENITE IN CANADA

Rio Canadian Exploration, the exploration subsidiary of the Rio Tinto Mining Co. of Canada, is reported to be obtaining very favourable results from its molybdenite prospect in the Echo Lake area of North-western Ontario. It is believed that the property may develop into a massive tonnage proposition. Rio Tinto Mining is controlled by the Rio Tinto Co. Ltd.

#### AUSTRALIA'S MANGANESE RESERVES

Australia's reserves of manganese ore increased by 36 per cent in the past 18 months, according to the Minister of National Development, Senator Spooner. In the twelve months to November 30, Australian companies and syndicates found additional reserves totalling 139,000 tons and exported ore worth £A345,000. Known reserves are still insufficient to provide the required proportion in relation to Australia's known iron-ore reserves.

U.S. scrap prices have weakened and since the turn of the year more material has been on offer. In other parts of the world there are some signs that stocks of copper scrap are beginning to move again after a lengthy period of inactivity.

In the U.K., consumption of copper remains good and orders for semis are still being booked with American importers. There have again been rumours from Chile that a cut-back in production may be authorized. The majority opinion is, however, that even if a 10 per cent cut is made now, this will do little more than stabilize prices at present levels although the actual announcement itself may cause a temporary flurry in the upward direction. The disparity between the London and New York prices is again making shipment of metal possible and this may account for the slight reduction in stocks in official warehouses to 20,054 tons.

#### TIN ON THE TURN?

The tin market has again been through a shaky period but by Tuesday a contango had again been established and there is a considerable body of opinion which thinks that the supplies of prompt metal will diminish rapidly during the coming weeks and that operators may go on the bull tack in the expectation that prices will rise considerably during the next two months. There is little doubt that the flow of tin metal will be seriously hampered by the strike at Penang and the hold-up in shipment of Indonesian concentrates. If the American consumers re-enter the market to any marked extent a rise to £780 per ton can be considered likely.

Stocks in official warehouses again showed a jump of over 1,000 tons to a total of 13,201 tons, and some people are saying that it will soon be necessary for the buffer pool manager to call in the final contribution. More about this will probably be heard after the next meeting of the Council on January 22. On Thursday the Eastern price was equivalent to £738 per ton c.i.f. Europe.

### COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

Markets are still under the influence of turn of the year holidays. During the past week there has been little interest and price movements have been small with a slightly firmer undertone in tin, lead and zinc, whereas the copper market still has no friends.

#### HIGHER TARIFFS NO ANSWER TO U.S. PROBLEMS

The main general topic has again been the question of U.S. tariffs as apart from the pending decision on increasing their lead and zinc tariffs, a move is now on foot to have the copper duty raised from 2 c. per lb. to 4 c. per lb. to operate when the price of copper is under 30 c. per lb. (some quarters are even asking a basic price of 32 c. per lb.) against the present basic price of 24 c. per lb. Those who advocate higher tariffs in the U.S. seem to have ignored the fact that post-war America is a net importer of metals. It is interesting to meditate for a moment on the possible developments if the lead and zinc duties are increased. One of the reasons given for the raising of the tariff was that the domestic price could be advanced to a level more beneficial to U.S. mining companies. It is now apparent that no possible rise in duty will enable this to be done, as world prices have already fully discounted the adjustment. It is to be expected that from present levels the world prices will go up and

American prices will remain the same whilst the flow of metal into America will remain unchecked.

The same could happen in the case of copper as there is already almost a 4 c. span between the U.S. producers' price and the world price, and it is difficult to conceive that the American Government could agree to an even higher tariff than 4 c. per lb. in view of their overall trade policy. Such an action would undoubtedly bring retaliation. There is really only one answer to the problem and that is for the U.S. to face the fact that a proportion of their production is probably the most expensive in the world and that in times of surplus, such production must be amongst the first to cease.

#### COPPER FALLS FURTHER

The weakness in the copper price structure extends throughout the world. Custom smelters in America have been unable to maintain the 25½ c. per lb. level in the face of dealers offering copper at almost 1 c. per lb. below this level, and have cut their price to 25 c. per lb. The U.S. producers' price remains unchanged at 27 c. There seems considerable doubt as to whether the customs smelters will be able to hold even this lower price for long, and a further cut in this price would presumably make a reduction in the producers' price practically inevitable.

#### LEAD-ZINC BETTER

The lead and zinc markets have been slightly better, partially owing to a shortage of nearby metal due to shipments across the Atlantic and partly to the realization that, especially in the case of zinc, the present price is uneconomical.

Closing prices and turnovers are:

	Jan. 2		Jan. 9	
	Buyers	Sellers	Buyers	Sellers
<b>COPPER</b>				
Cash	£179½	£180½	£175½	£176
Three months	£183	£183½	£179	£179½
Settlement	£180½		£176	
Week's turnover	8,600 tons		7,150 tons	
<b>LEAD</b>				
Current ½ month	£72	£72½	£72½	£72½
Three months	£72	£72½	£72½	£72½
Week's turnover	3,450 tons		1,700 tons	
<b>TIN</b>				
Cash	£730	£730½	£730	£730½
Three months	£728½	£729	£731	£732
Settlement	£730½		£730½	
Week's turnover	2,575 tons		1,610 tons	
<b>ZINC</b>				
Current ½ month	£61½	£61½	£62½	£63½
Three months	£61½	£61½	£62½	£62½
Week's turnover	5,225 tons		5,625 tons	

London Metal and Ore Prices appear on the inside back cover.

## Mining Finance

# All In Step But Lorraine

Six Orange Free State gold producers in the Anglo American Corporation group—Western Holdings, Free State Geduld, President Brand, President Steyn, Welkom and Lorraine—published their annual reports this week covering operations for the twelve months ended September 30, 1957. Close watch is kept on the progress of all South African gold producers through their quarterly statements so that the annual accounts are not compounded of the stuff calculated to excite the market. Indeed, opportunity to dispense information which could be classified in any way as "news value" is naturally slight and this point is often overlooked. On the other hand, the annual report viewed as a round-up of the facts and figures disclosed during the year does provide a general overall picture of what the technical health of the mine is like and, where necessary, enables the chairman to put up a signpost or two indicating the probable outlook in the year ahead.

In the case of *Western Holdings*, Mr.

Spiro, in his review from the chair, did not find it difficult to be happy about the mine's progress whether he looked over his shoulder at the year just gone by or viewed the months ahead. In fact last year, payable values in the No. 1 shaft area averaged 991 in. dwt. with 92.4 per cent payability and these values, he said, could be expected to continue when haulages are extended to the common boundary in "due course". The chairman's remarks concerning faulting are also most encouraging. Further developments in the upper levels of the mine have clarified the position, and faulting has proved less severe than expected.

On the capital front Mr. Spiro states that plans are in hand for the extension of plant capacity from the present 125,000 tons per month to 150,000 tons. This should begin towards the end of 1958, in order to take the additional tonnage available on completion of the No. 3 shaft system (due for the second quarter of this year) and the subsequent exploitation of the mine's western area.

Nor did Mr. Spiro have any reservations about *Free State Geduld*. Underground development last year was successfully directed towards bringing about a better balance in mining operations as between No. 1 shaft and No. 2 shaft by the more intensive development at the No. 2 shaft area. This is the richer part of the mine and the five working levels now established are to be developed with all speed this year. With regard to the company's policy about breaching the "jack-pot" zone, the chairman explained that development of this area is impracticable at present for the simple reason that a development-end driven towards the famous Geduld Borehole No. 1 (which yielded over 23,000 in. dwt.) would serve no useful purpose in providing stope tonnage in view of its remoteness from the shaft and the present difficulty of providing sufficient ventilation. Moreover, the reef in the Geduld No. 1 Borehole was intersected at 3,900 ft. whereas existing workings are some 400-600 ft. below this level. However, during the coming year this area is to be investigated by development up-dip from level 43 and there is, too, a cross-cut to be driven on level 39 from No. 2 shaft towards the borehole. This involves a considerable amount of work and it will, therefore, be some time before stope connections can be established to permit development work to be undertaken in the immediate vicinity of the borehole.

This year will also see the extension of the treatment plant from its present 100,000 tons to 125,000 tons a month. The capacity of the reduction plant is already 125,000 tons a month but before the company will be able to increase its tonnage throughput to much above its present throughput of 64,000 tons a month a new ventilation shaft must be sunk from the surface. Sinking is to commence during the latter half of this year.

In his review of *President Brand's* operations, Mr. Spiro tells of the continued necessity to increase development in the No. 2 shaft area—the relatively less rich area—in order to bring about the desired balance in mining operations between No. 1 and No. 2 shaft areas. This explains the slight drop in recovery values and ore reserves experienced last year and which may be expected to continue. Yet the small decrease in the milling grade envisaged will be more than offset by the higher tonnage throughput so that revenue should continue to rise each month as heretofore.

The chairman also settled a basic point of interest when he outlined the programme of shaft sinking necessary before the company could expand its tonnage throughput. This involves the completion of the No. 2 sub-vertical hoisting shaft to complement the No. 2 circular sub-vertical ventilation shaft recently completed and the sinking of a ventilation shaft from the surface to level 46. It is hoped that both these shafts will be commissioned more or less at the same time towards the end of 1958. These facilities once available will enable underground development to proceed at a pace which will allow a milling rate of 100,000 tons a month.

## LONDON MARKET HIGHLIGHTS

Mining share markets generally made a not very encouraging start to 1958. Business remained obstinately at a low level and while there were no particularly severe falls in prices there were also very few plus signs on the various price lists.

Even South African gold shares, which had previously been so firm, began to droop unhappily. As expected, the December monthly profit returns had little effect on the market, but the spurt in Hartebeest's earnings to a new high-record should have produced, it was thought, a better response in the share price than a slight easing to 59s. 9d. Similarly, Vaal Reefs (40s. 3d.) gained little comfort from their higher monthly profits and the news that Anglo American had exercised its option on 500,000 shares at 35s.

One bright spot was the start of dealings in Free State Geduld new shares which immediately bounded to 5s. 3d. premium; they have since settled at that price in much quieter dealings, business being limited by the fact that acceptance forms for the shares are not due to be sent out until January 16.

Middle Wits (13s. 1½d.) at one time perked up on week-end Press comment and Winkelhaak (17s. 6d.) made a modest response to their high value borehole strike. Otherwise, the only feature worthy of note was the persistent Cape buying of St. Helena suddenly making itself felt in a London market which did not seem too well supplied with stock. "Saints" thus jumped to a very firm 38s. 9d. and the general opinion at this end suggested that a very encouraging quarterly report might be seen next week. Among the Finance Houses, Union Corporation improved to 41s. 1½d. in sympathy with the rise in "Saints" but others in this group were

occasionally easier. African and European came back to 60s. in a narrow market now that the Anglo American bid for the company has been accepted in respect of 86 per cent of the equity.

New reports of Russian diamond discoveries depressed diamond share prices. Anglo Trust tumbled 7s. 6d. to 153s. 1½d. and De Beers fell to 80s. 7½d., their lowest since 1954; later, news of record sales of stones in 1957 produced a partial rally to 155s. 7½d. and 82s. 6d. in the respective share prices.

Elsewhere, Platins continued their recovery from the recent low levels reached as a result of falling demand for the metal and production cutbacks at the Rustenburg mines. Potgietersrust moved up to 7s. 6d. and Lydenburg were a better market at 8s.

Base-metal shares remained rather in the doldrums. Business fell away and prices were inclined to droop. Tins were more concerned with quota restrictions than with the course of a not very inspiring metal price and the announcement by several Malaysians of their output quotas failed to help the market. Nigerian tin mines were particularly dull on the fact that they are poorly placed under the restriction scheme in view of their expanded production in recent years partly in order to satisfy demand for columbite. In this group, Amalgamated Tin fell to 5s. 6d., the lowest for many years.

Lead-zincs were hardly altered, Lake George remaining at 4s. 1½d. despite the tenor of the annual meeting and the failure so far of the search for new ore reserves. Copper shares moved narrowly in quiet conditions, but a feature was the steady Continental demand that raised "Tanks" several shillings to 113s. 9d.

President Brand is also planning to develop its south-eastern lease area which is virtually isolated from the planned development from the No. 2 shaft by the Arrarat fault. This is to be achieved by sinking a joint shaft system in conjunction with President Steyn with whom the cost will be shared.

President Steyn's annual report is unexceptional. Steady progress is being maintained, and it is planned to raise the tonnage throughput to 100,000 tons a month, which figure will allow for the elimination of waste amounting to approximately 10 per cent by sorting at the surface.

Good news for Steyn is also implicit in Mr. Spiro's account of the progress made with the sinking of the Welkom mine's No. 3 joint shaft system, the ventilation capacity of which is to be shared with Welkom and President Brand. President Steyn is advancing twin cross-cuts on Level 27, and when these connect up with the Welkom joint shaft system the company can then undertake the exploration of the area west of its No. 1 shaft. The joint shaft system will be commissioned in the second quarter of this year.

The important point Mr. Spiro brings out in the report on Welkom is that following the completion of the company's No. 3 shaft system in the second half of this year, it will be possible to begin development from the shafts to explore the south-western—and thought to be a relatively rich—area of the property.

Otherwise the chairman points out that profits from gold and uranium last year did not cover capital expenditure, and also that although water troubles in the upper levels of the mine have diminished, their place has been largely taken over by emissions of methane gas.

Last and (for once the cliché can be avoided) definitely least, Mr. Spiro has the unenviable task of drawing a picture—it may be a noose—of *Lorraine*. This proves not an easy task, either for the chairman or the scribe, and it is perhaps justice in this case to quote verbatim from Mr. Spiro's concluding paragraph on the future outlook for this mine.

"Looking to the future, the general trend of values disclosed in development during the past year, coupled with the ore reserve figures, does not indicate that it will be possible to bring about any immediate increase in the grade in either gold or uranium production, nor would the fairly heavy expenditure involved in expanding the plant and intensifying development still further with a view to increasing production be warranted under present circumstances. Unfortunately, the overall working profit, from

gold and uranium combined, has hitherto proved too small to cover the capital expenditure, including expenditure on exploratory operations, which has had to be incurred at the mine, and as a result the funds available to the company through borrowings have been reduced steadily."

#### WINKELHAAK: THIRD TIME LUCKY

Winkelhaak Mines, the young developing gold mine in the Bethal area, published its quarterly report at the beginning of this week. During the December three months, three boreholes were drilled. Borehole WS 17, drilled 3,100 ft. west of No. 1 shaft, missed the Kimberley Reef due to faulting. Borehole WS 18, drilled 3,600 ft. north-west of No. 1 shaft, cut the Kimberley Reef at 1,732 ft., but gave only low values. Borehole WS 19, drilled 1,800 ft. north of No. 3 shaft, intersected the Kimberley Reef at 2,064 ft. The original intersection was incomplete, but yielded 18.75 dwt. over 58.2 in. equivalent to 1.091 in. dwt., while the deflection, which was complete, gave the good value of 25.25 dwt. over 60 in. equivalent to 1.515 in. dwt.

#### RECORD DIAMOND SALES

De Beers Consolidated announce that the net diamond sales of £76,772,112 in the year ended December 31, 1957, were a new record, beating the previous highest figure (1956) by some £2,200,000. It is interesting to note, however, that the increase is entirely due to an advance in gem sales, since industrial sales show a marginal reduction on the 1956 figure. Sales for the last quarter of 1957 and the preceding four periods are summarized below:

Quarter ended	Gems (£000)	Industrial (£000)	Total (£000)
Dec. 31, 1957	12,264	5,372	17,636
Sept. 30, 1957	15,114	6,330	21,445
June 30, 1957	14,467	5,482	19,949
Mar. 31, 1957	19,972	6,770	17,742
Dec. 31, 1956	13,742	5,944	19,686

#### RAND AND O.F.S. RETURNS FOR DECEMBER

The Christmas holiday season had a noticeable effect on the S.A. Gold Mine returns for the month of December, and the great majority of producers announced lower throughputs and reduced profits. This trend was accentuated by the assumption of a gold price 3d. lower at

248s. 9d. Chief exception to the general decline was Anglo-Vaal's prominent Klerksdorp producer, Hartebeestfontein, whose total profit from gold and uranium net of loan repayments came out £51,000 higher at £532,022. Contributory factors were a fall in costs to 64s. 0d. from 67s. 10d. and a grade 0.5 dwt. higher at 11.0 dwt. per ton. Vaal Reefs, another Klerksdorp mine, also achieved record results by returning a gross £312,322 from gold and uranium against £304,570 in November. Here the rise was largely attributable to increased earnings from uranium. Elsewhere, Western Holdings lifted its grade from 10.2 to 10.7 dwt. per ton, while both Freddie's and E.R.P.M. had useful reductions in costs. Operations at City Deep were adversely affected by a fire, losses from which are insured against. Our usual table appears on page 50.

#### JANTAR'S DISTRESS — OFFICIAL

Mr. C. A. P. Tarbutt's circulated statement to members of Jantar Nigeria lends force to the somewhat sombre opinions expressed in this column last week regarding the company's immediate future. In fact, Jantar's production quota for the first period of tin restriction is to be on a basis of 39 tons per quarter—40 tons was mentioned here in last week's issue as being the likely figure—and, says Mr. Tarbutt, should restriction remain in force for longer than the initial three months, it will necessitate reorganization of Jantar's operations. The effect, he says, will be serious. Nevertheless, in view of Jantar's extensive reserves and modern plant, and the work on the new sub-basalt lead (which yielded its first 11 tons of metal in 1957), the present price of around 2s. 4½d.—the year's lowest—seems to be one at which to stick, even if some time is to elapse before one can safely say "twist".

#### ONE CENT MAY MAKE ALL THE DIFFERENCE

Mr. R. M. P. Preston, at the annual meeting of Lake George Mining Corporation held earlier this week, devoted the major portion of his address to shareholders to the depressing effect on the company's revenue on the fall in base-metal prices during the last year or so.

As a rough guide to profit fluctuations, Mr. Preston said that a variation of 1 c. a lb. or £8 sterling a ton in the combined price of lead and zinc resulted in a difference in profit of approximately £A100,000 per annum on the basis of 16,000 tons a month. By implication, Mr. Preston focused attention on the com-

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pany's present difficulties by pointing out that at the end of April last, American prices were 16 c. for lead and 13½ c. for zinc, or a combined price of 29½ c. Present prices for lead of 13 c. and for zinc 10 c. give a combined price of only 23 c.

Despite reliefs on the other side of the equation, the possibility of requiring financial assistance from the New South Wales Government is not being overlooked. Some such aid may be essential if the mine is to remain viable and the 600 men employed by the Company are not to be thrown out of work.

On this point Mr. Preston told shareholders that if the Lake George mine were to cease operations, it was very doubtful if it would ever re-start, owing to the relative meagre ore reserves, and to the high cost of keeping the workings un-watered and in good condition while the mine was idle. It was, therefore, very desirable, he declared, to continue operations at the mine—even at a loss—for as

long as possible whilst waiting for an improvement in the price of those metals the company produced, which, the chairman believed, must eventually occur.

**Nigerian Tin Quotas.**—Further quotas of permissible tin exports have been announced. Ribon Valley will be allowed exports of 26.2 tons in the first period of restriction, while the allocation for United Tin Areas is 17.1 tons. Announcing this, the companies say that "appropriate measures have already been taken to align production to the present situation".

**Apex Earns More — Improves Payment.** — Apex (Trinidad) Oilfields increased their net taxed earnings in the year to September 30 last to £773,817 from the previous year's figure of £616,845. This made possible the distribution of 2s. per share (including a recommended final of 1s. 6d. per share) against a total of 1s. 9d. last year. Meeting. London, January 22.

**Anglo Take Up Vaal Reefs Option.**—The option over 500,000 shares at 35s. granted by Vaal Reefs to Anglo American in 1956 has been exercised. Vaal Reefs' issued capital is now £2,625,000 in 5s. shares.

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### Rand & Orange Free State Returns for December

Company	December 1957			Year ends	Current Financial Year Total to date			Last Financial Year Total to date		
	Tons (000)	Yield (oz.)	Profit* (£000)		Tons (000)	Yield (oz.)	Profit* (£000)	Tons (000)	Yield (oz.)	Profit* (£000)
<b>Goldfields</b>										
Doornfontein	84	35,280	182.1	J	512	211,644	1209.5	448	177,526	816.2
Libanon	103	23,034	52.9	J	706	137,765	319.5	580	129,810	328.6
Luipaards Vlei	70	12,630	4.2	J	440	78,378	50.8	499	89,611	60.9
Rietfontein	24	5,678	16.1	D	289	67,786	193.3	368	70,043	221.2
Robinson	74	15,695	8.5	D	908	187,253	116.5	917	185,524	54.7
Simmer & Jack	94	17,702	18.4	D	1,152	213,934	225.1	1,208	213,003	177.8
Sub Nigel	66	16,958	30.8	J	396	100,940	170.8	398	114,636	323.5
Venterpost	120	29,208	54.3	J	735	176,986	341.8	743	166,636	404.9
Vlaakfontein	48	17,281	83.8	D	591	211,811	1021.0	545	195,061	964.0
Vogels	98	22,639	50.3	D	1,185	273,564	805.1	1,203	296,014	915.0
West Drie	75	72,185	588.0	J	450	431,462	3637.0	450	419,817	3461.4
<b>Anglo American</b>										
Brakpan	131	18,942	15.1	D	1,354	220,794	159.5	1,284	225,797	155.4
Daggas	220	46,861	244.6	D	2,718	591,034	3213.1	2,637	595,135	3349.6
East Daggas	91	15,167	29.5	D	1,128	186,973	405.1	1,140	187,279	399.0
F. S. Geduld	62	44,374	300.8	S	190	134,333	923.0	139	64,841	286.1
Lorraine	62	12,058	17.4	S	184	36,145	138.2	180	34,298	123.8
President Brand	68	51,504	407.7	S	207	156,614	1251.8	181	138,909	1145.3
President Steyn	91	34,745	183.4	S	277	139,855	570.4	263	102,294	600.7
S. A. Lands	86	17,651	50.2	D	1,052	224,526	705.8	1,071	227,485	795.1
Springs	127	14,232	9.0	D	1,520	167,372	84.6	1,513	182,036	119.2
Vaal Reefs	68	30,646	181.3	D	751	333,314	1977.9	401	151,193	756.0
Welkom	79	23,921	61.4	S	242	71,398	189.8	255	63,068	135.8
Western Holdings	95	49,404	356.2	D	293	150,267	1095.4	264	117,765	755.8
West Reef Ex.	114	26,453	69.2	D	1,451	340,807	796.6	1,438	394,591	608.5
<b>Central Mining</b>										
Blyvoor	95	57,160	403.1	J	619	370,108	2658.1	632	355,334	2607.1
City Deep	139	27,201	5.5	D	1,780	347,907	175.3	1,851	357,427	68.3
Cons. M.R.	130	21,240	10.0	J	1,020	137,408	57.4	992	138,002	55.6
Crown	222	34,012	15.7	D	2,836	417,066	46.4	3,295	480,424	195.6
D. Roddepoort	179	32,087	52.0	D	2,393	387,188	618.4	2,188	378,941	634.4
East Rand Prop.	214	54,985	144.0	D	2,634	673,663	1598.4	2,538	661,494	2135.2
Harmony	72	29,531	134.4	J	495	197,745	1001.5	463	181,594	976.0
Modder East	131	13,166	2.0	J	828	83,518	18.1	836	86,298	50.8
Rose Deep	56	7,297	21.6	D	610	90,116	27.4	534	85,083	6.3
<b>J.C.I.*</b>										
E. Champ d'Or	12	393	L26.0	D	145	4,176	L317.4	162	8,738	L323.7
Freddies Cons.	49	16,907	L10.0	D	665	192,165	L175.2	787	151,548	L412.3
Govt. G.M.A.	60	10,266	1.4	D	1,077	182,647	L59.4	2,765	358,280	16.8
Randfontein	27	4,528	5.1	D	711	117,872	98.3	2,688	264,619	—
<b>Union</b>										
East Geduld	120	36,902	255.9	D	1,615	496,042	3488.2	1,720	531,083	3808.0
Geduld Prop.	83	13,174	12.0	D	1,144	181,321	262.3	1,245	197,266	376.7
Grootvlei	195	41,603	210.8	D	2,356	503,591	2641.2	2,344	504,902	2751.1
Marievale	69	18,213	81.0	D	854	224,297	1007.0	855	224,518	1039.3
St. Helena	112	32,920	179.0	D	1,392	405,752	2232.7	1,312	380,997	2083.6
Van Dyk	71	13,200	22.9	D	919	162,602	238.9	953	154,602	21.0
<b>General Mining</b>										
Buffelsfontein	108	35,724	178.3	J	664	216,202	1164.0	—	—	—
Ellaton	32	7,357	31.0	D	389	85,448	256.1	385	87,429	306.9
S. Roddepoort	28	6,838	24.0	D	177	41,588	151.3	174	40,572	149.2
Stillfontein	107	52,627	455.0	D	1,231	564,607	3809.9	1,079	428,680	2545.0
W. Rand Cons.	125	16,790	L3.1	D	1,669	237,787	145.5	2,509	282,370	—
<b>Anglo-Transvaal</b>										
Hartebeestfontein	86	47,300	324.4	J	515	282,415	1909.7	420	206,778	1240.3
N. Klerksdorp	10	1,124	L6.1	D	138	14,591	L71.9	131	14,815	L61.7
Rand Leases	168	25,284	5.2	J	1,050	159,501	61.2	931	143,991	L187.8
Village M.R.	31	4,532	L3.3	J	199	32,197	30.3	202	31,361	52.1
Virginia O.F.S.	97	24,736	49.3	J	612	146,218	399.5	541	111,042	334.4
<b>Others</b>										
N. Kleinfontein	90	13,377	0.5	D	1,172	140,059	44.0	1,235	145,846	12.8
Wit Nigel	18	4,264	6.6	J	107	25,542	25.8	108	23,297	49.1

Gold has been valued at 248s. 9d. (November 249s.) per oz. fine. L indicates loss. \*Working Profit. †Working Profit.  
\*Working Profit includes sundry revenue. Table excludes profits from Uranium, Pyrite and Acid, and also production from Uranium divisions at Luipaards Vlei, Randfontein and W. Rand Consolidated.

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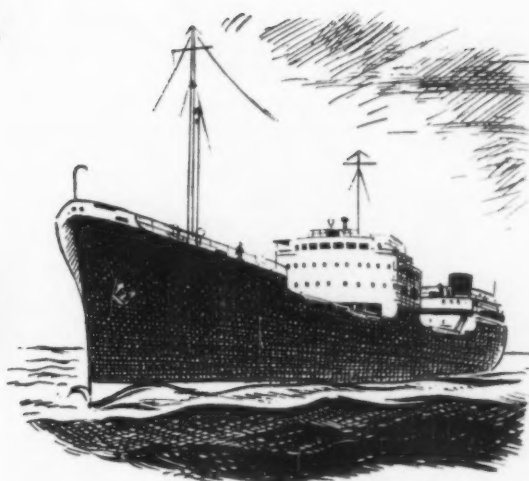
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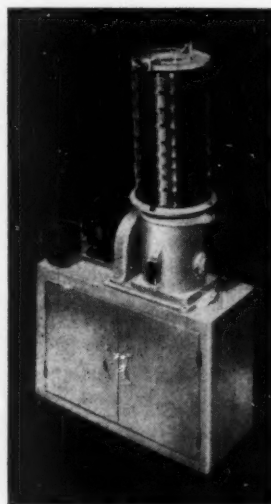
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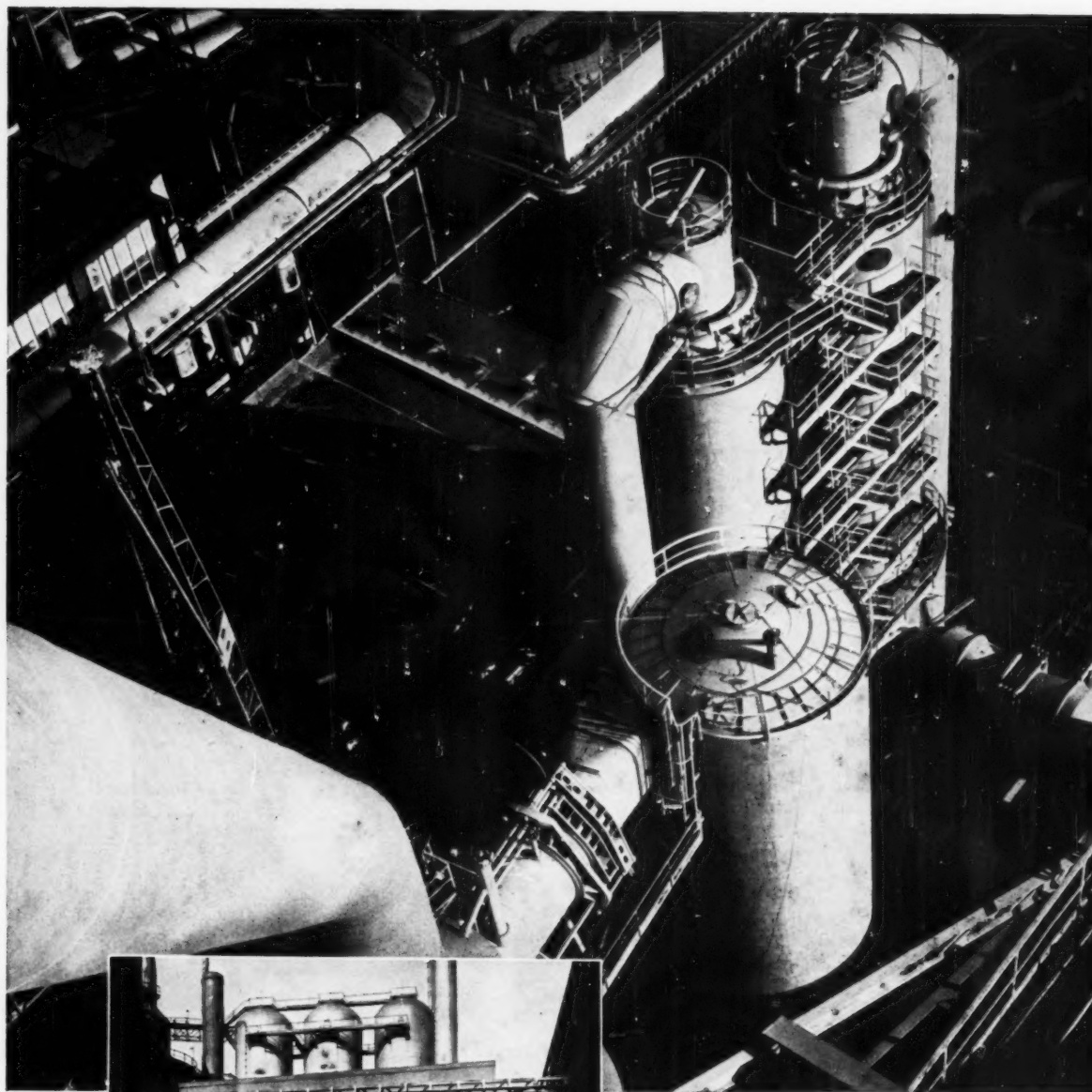
#### METAL PRICES

Aluminium, 99.5%, £197 per ton	Iridium, £27/29 oz. nom.
Antimony—	Lanthanum (98/99%) 15s. per gram.
English (99%) delivered, 10 cwt. and over £190	Manganese Metal (96%-98%) £310
per ton	Magnesium, 2s. 5½d. lb.
Crude (70%) £190 per ton	Nickel, 99.5% (home trade) £600 per ton
Ore (60%) basis 20s. 0d./21s. 0d. nom. per unit,	Osmium, £20/22 oz. nom.
c.i.f.	Osmiridium, nom.
Arsenic, £400 per ton	Palladium, £7 10s. oz.
Bismuth (min. 1 ton lots) 16s. lb. nom.	Platinum U.K. and Empire Refined £28/10 oz.
Cadmium 10s. 0d. lb.	Imported £27/£27 10s. nom.
Cerium (99% net), £13 18s. lb. delivered U.K.	Quicksilver, £69 0s. ex-warehouse
Chromium, Cr. 99% 7s. 2d. lb.	Rhodium, £42 oz.
Cobalt, 16s. lb.	Ruthenium, £16/£18 oz. nom.
Germanium, 99.99%, Ge. kilo lots 3s. 4d. per gram	Selenium, 53s. 6d. per lb.
Gold, 249s. 0½d.	Silver, 77½d. f. oz. spot and 76½d. f'd.
	Tellurium, 15s. 16s. lb.

#### ORES AND OXIDES

Bismuth .. .. .	65% 8s. 6d. lb. c.i.f.
Chrome Ore—	18/20% 1s. 3d. lb. c.i.f.
Rhodesian Metallurgical (semifriable) 48%	£17 5s. 0d. per ton c.i.f.
Hard Lumpy 45%	£18 0s. 0d. per ton c.i.f.
Refractory 40%	£12 5s. 0d. per ton c.i.f.
Smalls 44%	£16 5s. 0d. per ton c.i.f.
Baluchistan 48%	£12 0s. 0d. per ton f.o.b.
Columbite, 65% combined oxides, high grade	nom.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF <sub>2</sub> )	156s. 0d. ex works
Lithium Ore—	
Petalite min. 34% Li <sub>2</sub> O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Lepidolite min. 34% Li <sub>2</sub> O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Amblygonite basis 7% Li <sub>2</sub> O	£26 5s. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£22 0s. d/d
Manganese Ore Indian—	
Europe (46%-48%) basis 77s. 6d. freight	nom.
Manganese Ore (43%-45%)	nom.
Manganese Ore (38%-40%)	nom. (including duty)
Molybdenite (85% basis)	8s. 5d. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO <sub>2</sub> (prompt delivery)	£41/£42 per ton c.i.f. Aust'n.
Ilmenite 52/54% TiO <sub>2</sub>	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	90s. 0d./95s. 0d. per unit c.i.f.
Vanadium—	
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